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STEEL

ESTABLISHED 1882

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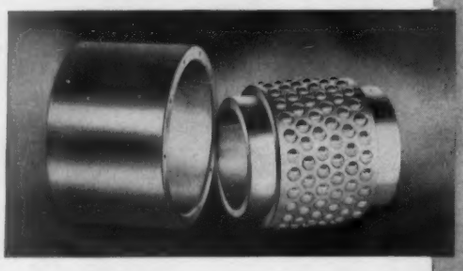
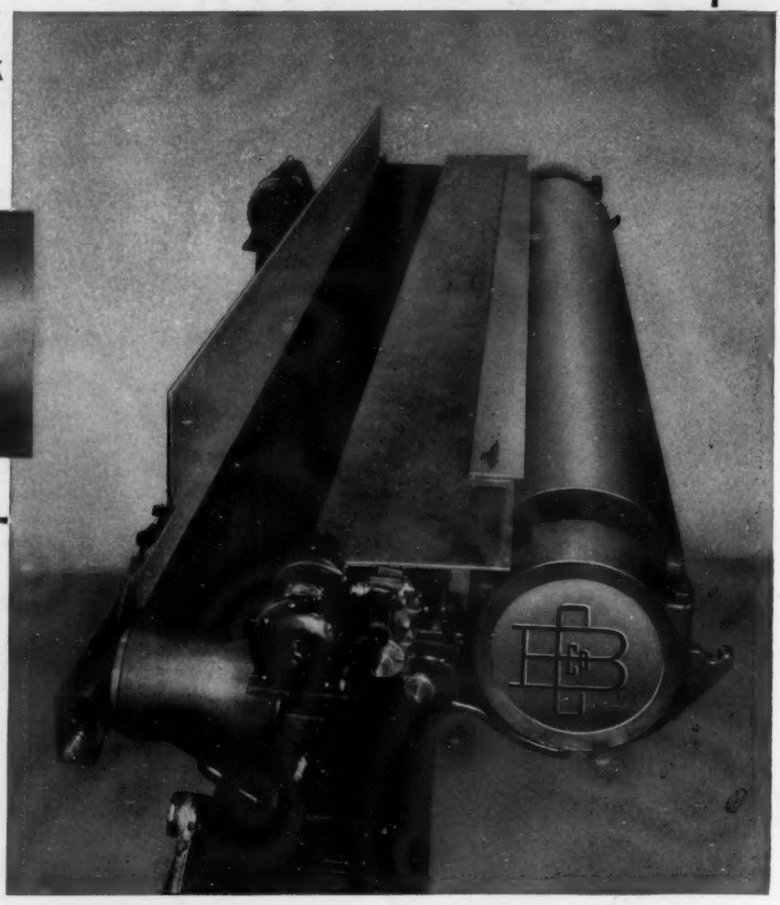
PRODUCTION • PROCESSING • DISTRIBUTION • USE

KEEPING PRESS ROLLS *On the Job*

BLACK-CLAWSON DOCTOR BLADES WORK SMOOTHLY ON BANTAM BEARINGS





Oscillating doctor blades *must* move with complete freedom—so The Black-Clawson Co. turns to Bantam for specially designed reciprocating ball bearings—bearings that allow the shaft to oscillate smoothly, and to move axially as well.

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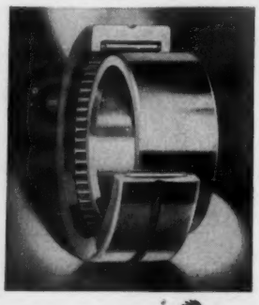
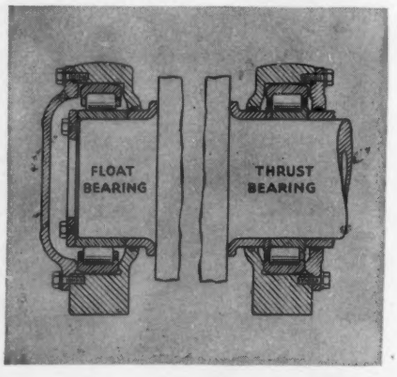


(*Left*) **BANTAM'S QUILL BEARING** is ideal for securing the advantages of anti-friction operation in paper mill applications where space is limited. A compact, low-cost unit, it has exceptionally high capacity in proportion to its size.

(*Below*) **SPECIAL BEARINGS** for driers have an ingenious rocker design which eliminates the sliding friction necessary in other types to permit self-alignment—another instance of Bantam's skill in design.



BANTAM BEARINGS

STRAIGHT ROLLER • TAPERED ROLLER • NEEDLE • BALL

STEEL
PRODUCTION • PROCESSING • DISTRIBUTION • USE

HIGHLIGHTING
THIS ISSUE

■ LAST week steel production moved up another point (p. 79) to 94½ per cent of ingot capacity. Despite this high level of output, new orders continue to gain, so that deliveries in certain products tend to get further into arrears. Some bar mills (p. 245) are unable to promise shipments before Dec. 1. Stainless steel sheets are difficult to get in less than eight weeks. At the same time, consumers have assurance from Walter S. Tower (p. 75) that no system of priorities or tonnage allocation is needed. Present steel producing capacity of the United States, he says, is ample to meet all essential needs now in sight and no large-scale expansion of basic facilities is required.

• • •

England Speeds Up

Overcoming tremendous handicaps, England now is producing more steel than at the time of the war's outbreak, says Vincent Delport, STEEL's European manager. He tells of British reliance on the United States. He mentions ingenious devices (p. 74) that make it possible to black out the glow of furnaces during air raids. . . . Scrap supplies (p. 77) are held adequate, with no justification for runaway prices. Manganese supplies (p. 76) are equivalent to more than two years' requirements. Tin stocks represent more than one year's supply. Now under review are eight proposals for building a tin smelter in this country. Aluminum producing and rolling capacities are to be enlarged.

• • •

Metal Congress

This year's National Metal Congress and Exposition (p. 157) has unusual significance in view of the present emphasis on production. Scope of the technical sessions (p. 225) and of the show (p. 237) are such as to merit large attendance. . . . The steel industry (p. 78) will not be severely burdened by the new excess profits tax, at least this year, says an authority. The machine tool industry finds unfair the feature by which the 5-year amortization provision is retroactive only to June 10 whereas the excess profits provision is retroactive to Jan. 1. . . . New house bill would provide a 6-man economic defense board to have broad powers of regulating tariffs and foreign commerce. . . . Canada (p. 90) will have an aircraft engine plant.

• • •

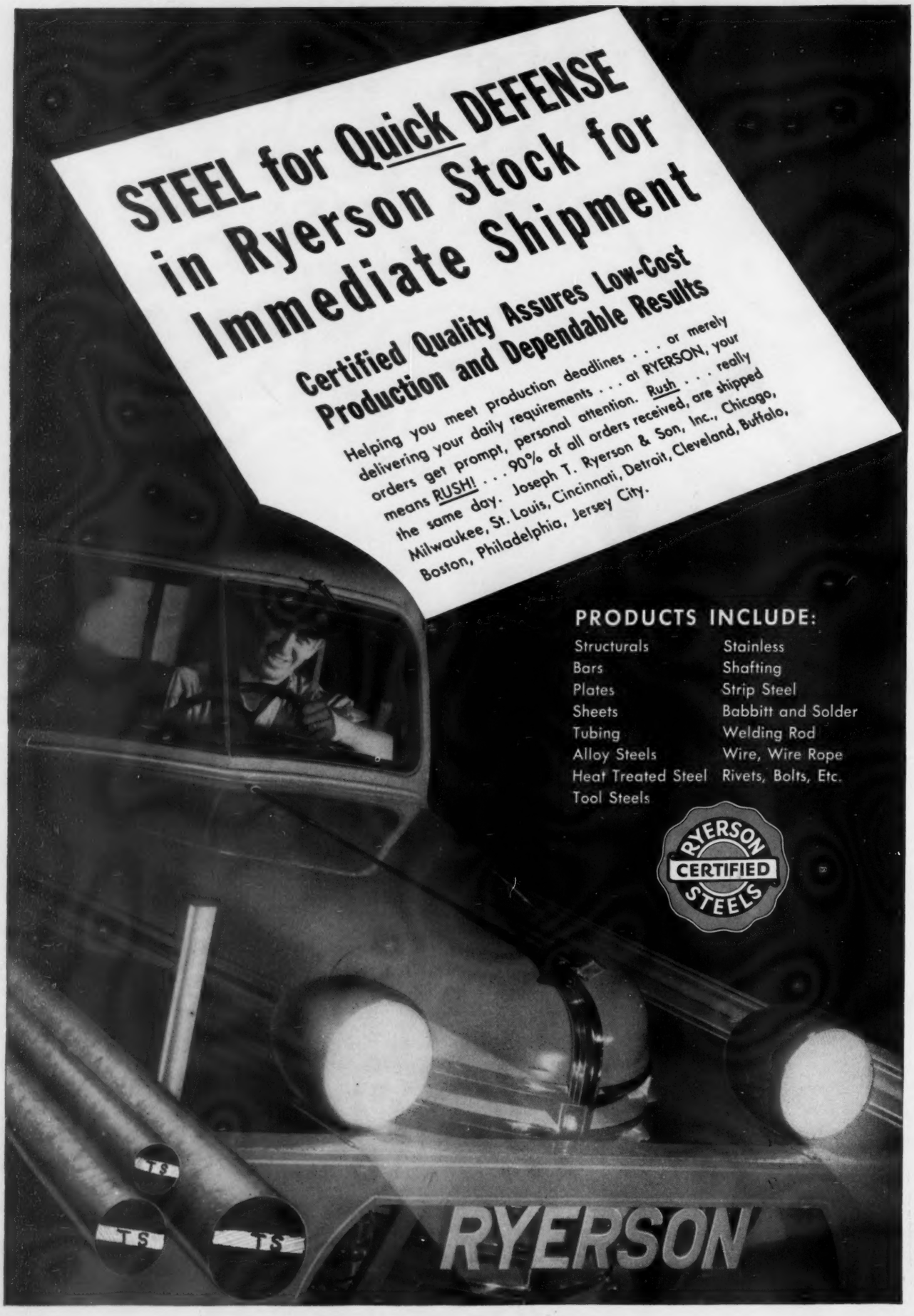
White Walls And Ceilings

Seeing tasks are made easier when plant walls and ceilings (p. 98) are covered with white or high-reflecting paint, says James A. Meacham. The result takes the form of better and increased production. . . . Crane inspection, says F. L. Spangler (p. 102), is a maintenance "must." He outlines procedure aimed at always having cranes ready for service when they are needed, also at promoting safety for men and equipment. . . . Fred B. Jacobs (p. 114) describes a widely adaptable type of heat-treating equipment used by a truck axle manufacturer. . . . Tongs of a new type (p. 138) are designed for greater safety in using cranes and hoists. . . . Much new and improved industrial equipment (p. 124) is available.

• • •

Weighed in Motion

A. R. Butler (p. 106) discusses design of welded dies, using hard-facing metal deposits at critical points of new dies, as well as in repairing old ones. The technique can be varied to meet particular requirements. . . . B. T. Connolly (p. 118) describes materials handling systems in which stock is weighed automatically while in motion. Applications include handling and weighing of coal, coke, blast furnace charges, ingots and other materials. . . . New books (p. 140) include lessons in arc welding, a revised list of New England manufacturers and (p. 138) a revised volume on metallurgical practice. . . . Unusually low prices apply (p. 137) to a new line of cemented carbide-tipped standard cutting tools.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British Steel Output

LARGER THAN AT WAR'S OUTBREAK

By VINCENT DELPORT
European Manager, STEEL

LONDON

■ AS A RESULT of the first year's war operations, Germany has obtained control of the steel resources of the major part of Continental Europe. Excepted are Russia, which undoubtedly reserves for herself her own output of some 20,000,000 tons, and Sweden and Spain whose total capacity for steel production at present is not likely to exceed 1,750,000 tons.

Germany can obtain from the two last named countries a valuable contribution in the form of iron ore. The steel output of Austria, Poland, Bohemia-Moravia is now part and parcel of the resources of the greater reich. Italy's production serves the common cause of the axis, and the large combined resources in steel of France, Belgium and Luxemburg are at Germany's disposal—for if the invader does not shrink from diverting to his own purposes such a vital necessity as foodstuffs he certainly would not hesitate to put to full contribution the steel producing capacity of his subdued western neighbors.

That is one side of the picture, shaded by a certain amount of destruction caused in the Ruhr district by British air offensive. However, special objectives are aimed at, more directly concerned with the manufacture of armaments. Effect on Germany's actual steel resources is of no great consequence. There are other industries, more vital to Germany's war needs, that are more specially selected for attack.

There are, of course, obvious difficulties confronting the German steel industry in shifting raw materials and finished products across long distances by means of a sorely tried transport system.

The other side of the picture shows Great Britain, sustaining alone the full brunt of massed air attacks aimed at her whole production system, and aimed as well at the morale of her people by indiscriminate—or astonishingly unskillful—bombing.

And what is the result? The morale of the people, through the whole cross-section of the population, is standing the test; the spirit of resistance is intensified by the savage methods of warfare used by the enemy and is shared more and more by the other members of the British commonwealth of nations. British production of steel and other essential products is greater now than at any time since the onset of the war, and the trend is towards still further expansion with almost unlimited resources available from the various parts of the empire. Add to this that the unimpaired efficiency of the British navy enables the supplies contributed by the United States to reach British shores. It can also be said that all outside contributions to the British effort are stamped by an enthusiastic willingness to help; no compulsion has to be exerted over people forced to submission.

Thus, at the beginning of the second year of this war, Britain is producing more steel than when the war started—probably more than at any time in her history. No destruction of iron and steel plants has so far been experienced. It is true that production is being interfered with to some extent by interruptions due to the occasional proximity of air raiders, but even so, the longer hours worked and various other measures taken to intensify output more than make up for any loss due to such interruptions.

Blast furnaces, steel furnaces, rolling mills and their subsidiary departments are in operation day and night, practically seven days a week. Special arrangements are made to afford the workers occasional periods

■ Great Britain currently is producing more iron and steel than when the war started and probably more than at any previous period, writes Vincent Delport in the accompanying quarterly survey. This is despite curtailment of iron ore and semifinished steel imports from usual sources of supply, and despite massed air raids which frequently interrupt production. The quick response by American steel mills to England's plea for semifinished is credited in large part for the Island's sustained output of necessary war materials.

of rest and to maintain and recondition plants. Ingenious devices have been found and are applied, which enable the glow of furnaces to be blacked out in a very short time at night when an air raid is approaching.

The position of raw materials and semifinished steel had become critical immediately following Germany's invasion of Belgium and Luxemburg.

Subsequent collapse of France was at that time a serious blow to British steel production. Particularly as regards semifinished steel, large supplies that were being obtained from these countries were completely stopped. The German advance and the entry of Italy into the war on Germany's side also menaced the supplies of iron ore from North Africa and Spain, Swedish supplies having already been stopped.

Despite the drying up of these sources of supply, the British steelworks now have at their disposal the necessary tonnages of raw and semifinished material to enable them to maintain their mills at a peak and, in fact, according to reliable reports, enough coke and ore is available to permit some reserves to be built up.

The iron ore situation itself was overcome largely by the measures that had been taken to increase domestic production. Taking as a reference the year 1937, which was a year of high production, some 20,000,000 tons of iron ore was consumed for a pig iron output of 8,500,000 tons. Of the ore consumed, about 14,000,000 tons was of domestic extraction and just over 6,000,000 tons was imported. The actual output of ore in Britain in that year was 14,215,000 tons and imports amounted to just under 7,00,000 tons. Of these imports, 2,860,000 tons came from countries now completely under German control; 2,165.500 tons from French North Africa; 1,115,000 tons from Spain and Spanish North Africa, and about 809,000 tons from other sources which are still available.

Domestic Ore Output Up

At present no ore can be imported into Britain from Scandinavia or France, but supplies are being received from Spain and North Africa, and imports from free sources have no doubt been increased, although the capacity of these sources does not appear to be such as to allow any considerable increase. America does not appear to have made any substantial contribution, price being, no doubt, an important consideration. From this it would seem that the increase of domestic output must be substantial and that, not only has the production of active mines been intensified, but long neglected deposits must now be worked again. However, figures are not available.

Coke supplies are plentiful and Britain does not depend upon imports for her coke. As regards scrap, recent events on the Continent have not materially changed the situation as most of Britain's scrap imports come from America, and her exports were mostly consigned to countries now under German control. However, as always and everywhere, scrap supplies constitute a difficult problem, specially during periods of intense production. High grade scrap is particularly difficult to obtain. The high price of imported scrap has an adverse effect on production costs, but in 1937 Britain imported only about 13 per cent of her consumption during that year.

Scrap Resources Inventoried

Just before this article was written, the minister of supply issued instructions to the effect that all national resources of scrap metals should be inventoried, including derelict buildings, condemned bridges, abandoned railroad lines, etc. This step in no way indicates any actual shortage, but it is taken in order to know the extent of what must be a considerable reserve.

The situation, as regards iron ore supplies, has a certain effect on methods of production, for the bulk of the ore available in Great Britain contains an average of barely 30 per cent iron and it is rather high in phosphorus content; the grades of scrap available also determine to some extent the composition of the charges.

Production of pig iron is sufficient for current needs and is supplemented by imports that come mainly from India. The greater part of the output is basic iron for steelmaking. Enough pig iron is available for the foundries, the light castings industry having had a slack time since the beginning of the war. Reserves of hematite pig iron are being broken into but hematite allocations are strictly controlled and it would be possible to increase production should the necessity arise.

Before the German advance in the west, Great Britain was obtaining substantial tonnages of semifinished steel from France, Belgium and Luxemburg. The sudden and complete stoppage of supplies from those sources seriously upset the planning of production of British rerolling mills. Contracts were immediately placed with American mills and before long shipments were arriving at British ports, supplemented by some tonnages from the Dominions. Thanks to the speed with which American works met the emergency the position is now reestablished, and a constant source of supply is assured.

All the points enumerated above indicate that the British iron and steel industry can now proceed with production at an increasing rate. Main difficulties are higher cost of production due to the higher price of imported materials, and a certain amount of interference due to occasional delays or interruptions in the inland transportation system which at all events, are rapidly cleared up.

Willkie in Duquesne Steel District

■ **Wendell L. Willkie rides past the Carnegie-Illinois steel mills in Duquesne, Pa., enroute to Pittsburgh where he defined his labor views. The Republican presidential candidate declared he favors collective bargaining in the best sense of the term, wage and hour legislation, and even would favor trying to make the Wagner act work under proper administration, before he would recommend modifying the law. NEA photo**

The steel control, which is responsible for the distribution of materials and steel products to the consuming industries, is working satisfactorily and surmounting day to day difficulties.

Ordinary commercial users are naturally strictly restricted in their supplies; tonnages can be obtained only by application to the control and are granted only for essential work, each case being treated on its merits. Bulk of the output is reserved for war production in accordance with a priority schedule established by the ministry of supply.

For the same reasons, export trade is restricted also, although great efforts are made to release as much as possible. Only certain classes of products are available for export, mostly finished products for which a relatively high price can be obtained. Thus, from the point of view of tonnage only, export figures would be far from spectacular, but from the point of view of value they are not negligible.

Loss of continental markets has been particularly felt in the tin plate trade, especially in connection with substantial French contracts that had to be canceled after that country's collapse.

Full Text of Tower's Statement On Steel Industry's Preparedness

■ PRESENT producing capacity of the iron and steel industry in the United States is ample to meet all essential needs now in sight, and no large scale expansion of basic facilities is needed, according to a statement issued last week by Walter S. Tower, president, American Iron and Steel institute.

The statement was based upon a survey of conditions in the industry and was authorized by the institute's board of directors, members of which are heads of representative steel companies.

"The idea has been in circulation recently that the country is facing a steel shortage and that the defense program may presently be affected by a 'bottleneck' in steel production," said Mr. Tower. "That idea is not supported by an analysis of the position of the industry. However, it evidently has excited the fears of some steel users and encouraged speculative buying.

"The situation at present is that all national defense orders are receiving voluntary preference by the steel companies. Commercial customers are getting all the steel they need without any serious inconvenience. No system of enforced priorities or allocation of tonnage is now necessary.

"The steel industry today has an annual rated producing capacity of approximately 83,000,000 net tons of ingots, including capacity of new furnaces installed since the first of this year. Steel requirements of the defense program are not expected to exceed an annual maximum of 7,000,000 to 8,000,000 net tons of ingots. Accordingly there appears to be no possibility of a shortage of steel for the armament program in any of its ramifications.

"Furthermore the industry's rated capacity for producing ingots actually is at least 10 to 12½ per cent below its real capacity, that margin being only the allowance for breakdowns and repairs of furnaces. With such a margin available the industry in an emergency could push operations to an average of 5 per cent above rated capacity, thus adding some 4,000,000 tons of ingots to yearly output. That would give the industry a total potential capacity close to 87,000,000 tons a year.

"Large sums have been spent by the industry during the last ten years for plant and equipment. It is in splendid physical shape. There is every reason to expect that the industry would be able to operate close to rated capacity for sustained periods, and to go beyond it for occasional periods. In 1917, for example, operations were maintained at capacity for seven consecutive months.

Walter S. Tower

President, American Iron and Steel institute, and liaison officer between steel industry and defense commission

"Predictions of a coming shortage of steel apparently are based entirely on the assumption that defense activities will lift the public's demand for steel products to levels at least equal to the hitherto unprecedented peak of 1929.

"Even if it were true that the 1929 peak of per capita use of steel for non-military purposes is to be reached, present steel capacity still would be equal to the demand. In that year the per capita domestic consumption of steel in the United States was less than 950 pounds of ingots. Applying that per capita figure to the country's present population gives a total of 62,000,000 net tons of ingots, or 25,000,000 net tons more than the annual average of domestic consumption over the last ten years.

"Should the domestic use of steel rise to that unheard of figure, with exports continuing at the current record rate of 12,000,000 net tons and maximum defense needs reaching 8,000,000 net tons, all at the same time, the grand total of all requirements figured in terms of ingots, would be 82,000,000 net tons. That compares with a rated capacity of nearly 83,000,000 tons and potential emergency capacity of about 87,000,000 tons.

"In estimating probable requirements for steel it is important to remember that not all the elements of demand ever rise to their peaks simultaneously, and that any such peak is a passing phenomenon which soon recedes. That is especially true of peaks in ordinary civilian demand.

Extensive Additions Unnecessary

"After a careful study of all available facts the steel industry foresees no necessity for any extensive additions to its capacity for making its basic raw product, ingots. Occasional minor dislocations of supply and demand may appear, together with certain deficiencies in capacities for some classes of products. But these can be corrected without any major additions to the industry's over-all steelmaking capacity.

"Such a deficiency appeared to be in the making early this year in electric furnace capacity, the output of which is used largely for special alloy steels. However, a number of companies have built or are building new electric furnaces and by the end of the year the country's electric furnace capacity will have been increased by more than 40 per cent to approximately 2,500,000 tons a year.

"What is true of steel ingots is true also of finished products. The country's rolling mill capacity, in the large, is ample for all possible requirements. For a few special products, some additions to facilities are already being made by various companies, but the need for extensive additions to finishing ca-

pacity does not appear probable.

"Should there be any important change in conditions which would result in urgent need for accelerated deliveries and largely increased requirements for military uses, it might superficially appear necessary to expand productive capacity as an emergency measure. Under those circumstances, however, it would be far more practical to supply the government's needs by diverting production to those purposes immediately and temporarily curtailing other less vital forms of consumption. That step would meet any emergency promptly, while installation of extensive additions to steelmaking facilities would require from 12 to 15 months."

Mr. Tower subsequently stated considerable recent ingot production has gone and is going into mills' and consumers' inventories in anticipation of avoiding future delays in deliveries. This, he added, has contributed to the recent high operating rate.

The building up of sizable stocks is expected to relieve pressure on mills in periods of peak demand as the defense program develops.

20,000,000 U. S. Dollars for Steel Plant in Fascist State?

■ IS BRAZIL in reality a Fascist state?

Did the United States aid a potential enemy in loaning that country $20,000,000 with which to build a steel plant?

Since the Export-Import bank recently authorized the loan a book has been published in Rio de Janeiro, which, according to a cabled dispatch to the *New York Times* from its correspondent at Buenos Aires, Argentina, has created a "sensation" in South American capitals.

The book, entitled *The National State, Its Structure and Ideological Content*, was written by Francisco Campos, minister of government and justice in President Vargas' cabinet.

"The Brazilian state, while democratic, is at the same time totalitarian, supreme authority being vested in the President of the republic, who exercises it in the name of the people in the interest of their welfare," he says.

Considerable space is devoted to explaining why the new order in Brazil has abolished the right of the Supreme Court to rule on the constitutionality of laws or to review acts of the government. In "the new state" President Vargas is above the Supreme Court, the functions of which are merely those of the highest court of appeal in the land.

"The parliamentary institutions in political life today are nothing more than garbage, destitute of any spiritual content or significance," states the author.

"There is no country that is not looking for its man of destiny, no people who are not clamoring for a Caesar. Democracy is a feminine process, lacking the masculine qualities necessary for solving the problems of today." He describes the whole democratic process as "irrational and out of date."

"The only persons who can have any doubts regarding the advance of the totalitarian system are those who are living in a fairyland of wishful thinking."

Throughout the book the author has referred to democracy in the past tense.

Diplomats and other informed observers of Pan-American affairs attribute unusual importance to the book because of the recognized intellectual leadership of Campos, who is the acknowledged ideologist behind the Vargas regime. He wrote the constitution creating the new order in Brazil, now known as the "New State."

The book is said to confirm the opinion that "Campos is a symbol of the totalitarian danger in South America." It explains that it is necessary to keep the masses in a permanent state of excitement so that at any moment they can be transformed from a latent state of violence into an effective force to be used in crushing any attempt to break down the unity of political command—the dictator.

Stettinius Outlines Position in Nonferrous Metals

WASHINGTON

■ SUPPLIES of manganese on hand or readily available to the United States are now estimated as adequate for more than two years' requirements, and tin stocks are estimated as equivalent to more than one year's supply, it was announced last week by E. R. Stettinius Jr., in charge of the industrial materials division, national defense advisory commission.

These estimates, which take into account unusually heavy demands which will result from the defense program, include stocks currently held by industry and the amounts already received or afloat to the United States under the government stock pile program. In the case of manganese the quantity available from Cuba has been considered, as well as an anticipated increase in domestic production, and substitution of low-grade domestic ores for high-grade imported ores in certain industrial uses.

Existing stocks have been protected by placing manganese on the export license list and new sources of supply and methods of processing are continually being investigated and encouraged.

A technologic committee on tin smelting has been appointed by Mr. Stettinius and the Metals Reserve Co., subsidiary of the Reconstruction Finance Corp. Committee will review eight proposals which have been submitted to Metals Reserve for building a tin smelter here.

Members are: Clyde Williams, director, Battelle Memorial institute, Columbus, O., chairman; Walter C. Smith, metallurgist, Cerro de Pasco Copper Corp., New York; John F. Thompson, executive vice president, International Nickel Co., New York; and F. W. Willard, president, Nassau Smelting & Refining Co., New York.

Mr. Stettinius also announced plans for further increases in aluminum production. Aluminum Co. of America will add three units to its Bonneville, Wash., plant which will increase production by 90,000,000 pounds annually. First unit at the plant came into production in September and a second will start operations in December. Reynolds Metals Co. is planning to start immediately on a plant to produce aluminum ingots at Sheffield, Ala. Capacity will be 60,000,000 pounds annually.

Mr. Stettinius said this country has sufficient bauxite to supply its own needs, if necessary, although considerable amounts now are being imported.

Aluminum fabricating capacity also is being expanded.

Producers' zinc stocks have decreased slightly more than 50 per cent since the end of April, according to Leon Henderson, of the defense commission. Consumers' stocks in the same period have declined only 13 per cent, and now are 82,300 tons. This represents considerably more than one month's supply at current rate of consumption.

Scrap Conference Finds Supplies Adequate; Prices "Reasonable"

■ SCRAP supplies for the defense program will be adequate and there exists no justification for any runaway price development. This was the consensus of a conference of representatives of the national defense commission, the steel industry and the scrap industry in Washington.

Leon Henderson, defense commissioner in charge of price stabilization, stated: "Our survey of supplies and prices shows that enough scrap will be available, and even at the current steel operating rate or at higher rates, the prices for scrap should not exceed and might be lower than the present level.

"The discussions between representatives of the consuming and dealing trade and commission members have removed any misunderstandings of the conditions of supply and within a week we hope to clear up the entire situation by discussion with the principal producers of scrap."

Prices of scrap iron and steel, the conference agreed, have been rising because some steelmakers have suddenly appeared as buyers in territories from which they formerly had not drawn. Conferees were confident that withholding of supplies and speculation can be avoided and that adequate and steady scrap supplies will be available at reasonable prices.

The defense advisory commission now is making studies on methods to obtain scrap from centers beyond the normal collection areas.

Representing the steel industry at the conference were: R. W. Wolcott, president, Lukens Steel Co., Coatesville, Pa.; L. D. Greene, assistant to purchasing agent, Bethlehem Steel Co., Bethlehem, Pa.; Wilbur Murphy, secretary, Weirton Steel Co., Weirton, W. Va.; C. A. Ilgenfritz, manager, purchases and raw materials, Republic Steel Corp., Cleveland; J. C. Miller, vice president, American Rolling Mill Co., Middletown, O.; T. R. Akin, president, Laclede Steel Co., St. Louis; L. B. Block, vice-president, Inland Steel Co., Chicago; W. W. McMillan, National Malleable & Steel Castings Co., Cleveland; Darwin S. Luntz, Luntz Iron & Steel Co., Canton, O.; and Walther Mathesius, United States Steel Corp., New York.

Iron and steel scrap dealers were represented by the following: Joseph V. Michaels, Hyman-Michaels Co., Chicago; Joseph E. Jacobson, Luria Bros. & Co., Pittsburgh; Joel Klasmer, Luria Bros. & Co., Philadelphia; David J. Joseph, D. J. Joseph Co., Cincinnati; Michael V. Bonomo and Herman Moskowitz, Schiavone-Bonomo Corp., Jersey City, N. J.; E. C. Barringer, executive secretary, Scrap Iron & Steel institute, New York.

"Board of Strategy" for SWOC

■ While industry strives desperately to build the materials for national defense this inner council of SWOC sits in Pittsburgh weighing possibilities of a "crackdown" on a large steel company whose products are essential to the armament program. The union received encouragement by telegram from none less than Defense Commissioner Sidney Hillman, who suggested the government might help by withholding defense orders from companies held by the labor board to be in violation of the Wagner act, a suggestion that brought quick and angry public protest. Left to right, standing, Noll Beddow and William Nitch, Birmingham, Ala.; Clinton S. Golden, Pittsburgh; seated, David J. McDonald; Philip Murray; and Van A. Bittner, Chicago. NEA photo.

$96,961,146 FOR SHIPYARD EXPANSION AUTHORIZED

Shipbuilding and steel companies last week were authorized by the navy department to spend $96,961,146 to enlarge plants to speed construction of the "two-ocean" navy. New facilities will be paid for by the government.

Companies and amounts they were authorized to spend:

Bethlehem Steel Co., Risdon-Union plant, San Francisco, $10,013,000 for site, wharves, shipbuilding slips, tools and equipment; San Pedro plant, Los Angeles, $2,756,000 for machinery, equipment, buildings and shipbuilding slip; Fore River plant, Quincy, Mass., $13,427,500 for slips, buildings, tools and equipment; Staten Island plant, $2,706,000 for buildings, piers, cranes, machinery and equipment. Bethlehem Steel Co. also was authorized to spend $23,607,700 for new furnaces, buildings and machine tools.

New York Shipbuilding Corp., Camden, N. J., $10,500,000 for ways, cranes and equipment.

Federal Shipbuilding & Dry Dock Co., Kearny, N. J., $5,500,000 for extension of ways, tools and warehouse.

Newport News Shipbuilding & Dry Dock Co., Newport News, Va., $14,000,000 for ways, piers, power machine shop and equipment.

Bath Iron Works, Bath, Me., $1,600,000 for fabricating shop and machinery.

Carnegie-Illinois Steel Corp., Pittsburgh, $5,354,000 for furnaces, buildings and machine tools.

Crucible Steel Co. of America, New York, $765,531 for machine tools.

Camden Forge Co., Camden, N. J., $2,873,695 for furnaces, buildings and machine tools.

Struthers - Wells - Titusville Co., Warren, Pa., $907,720 for furnaces, buildings and machine tools.

Gulf Shipbuilding Corp., Chickasaw, Ala., $2,500,000 for ways, shops, buildings and equipment.

Los Angeles Shipbuilding & Dry Dock Corp., Los Angeles, $450,000 for runways, cranes, buildings and equipment.

Excess Profits Tax To Fall Lightly on Steel Producers

■ BECAUSE of its huge investment in capital facilities, the steel industry will not be severely burdened by the new excess profits tax, at least during the current year, according to Fenner & Beane, industry and security survey corporation, New York, in an interview with STEEL.

Essentially, the new measure provides exemptions on the basis either of 8 per cent of invested capital or 95 per cent of average earnings during the period 1936 to 1939, inclusive. In view of the fact that the steel industry earned only 6.2 per cent of its investment during 1937, the best year in the past decade, it is probable that most leading steel companies will choose the exemption based on invested capital. In the decade 1931 to 1940, steel industry earnings averaged only 2 per cent of invested capital.

Normal Tax Higher

Whichever method of exemption is used, the tax rate is 25 per cent on the first $20,000 of excess profits, 30 per cent on the next $30,000, 35 per cent on the next $50,000, 40 per cent on the next $150,000, 45 per cent on the next $250,000 and 50 per cent on any excess profits thereafter, in all cases after an initial tax free allowance of $5000. In other words, the tax on the first $500,000 of excess profits is $204,000 and the tax payer must share any additional excess profits equally with the government.

The accompanying table illustrates the manner in which representative steel companies will be affected by the excess profits tax during the current year. In this connection it must be emphasized that estimates of 1940 net income are subject to a considerable margin of error, and that the method used by corporations for calculating earnings for tax purposes frequently varies from that used to prepare financial reports to stockholders.

On the basis of the accompanying calculations, it will be observed that six of the companies analyzed can significantly increase their earnings above estimated 1940 net income before becoming subject to the excess profits tax. Five companies will apparently be required to pay an excess profits tax. In only one case, that of National Steel, will excess profits tax be calculated on the basis of 1936-1939 average earnings exemption.

It should be noted, however, that the new excess profits tax measure also provides for an increase in the maximum normal corporation income tax from 20.7 per cent to 24 per cent. (This was increased from 18 per cent earlier in the year). For most companies in the steel industry, this will be currently more important than the imposition of an excess profits tax.

TAX BILL TO ENCOURAGE TOOL PLANT EXPANSION

Passage of the excise profits tax bill containing provision for rapid amortization of defense facilities will speed still further the production of machine tools for national defense, C. R. Burt, chairman, defense committee of the National Machine Tool Builders' association, Cleveland, and president, Pratt & Whitney division, Niles-Bement-Pond Co., Hartford, Conn., said last week.

"For many months," Burt pointed out, "the machine tool industry has been installing new equipment, hiring more men, working multiple shifts, and expanding its plants in the knowledge that increased machine tool output was absolutely vital to national defense. This was done in spite of the fact that the industry did not know whether or not the cost of such expansion could ever be recovered. The industry knew that there was a job which had to be done and went ahead.

"With the passing of the excess profits provision of the new tax law, the machine tool builder may proceed on facts instead of guesses, assured that he may recover the cost of purely defense facilities over a five-year period without being assessed excess profits taxes on the capital so advanced. This concrete definition of amortization terms will, I believe, pave the way for still further plant expansion and productivity in the machine tool industry, and help to assure the industry's capacity to meet in full the nation's machine tool defense requirements.

"It is indeed unfortunate that the amortization provisions of this bill are retroactive only to June 10 whereas its excess profits provisions are retroactive to Jan. 1. This unduly penalizes the very companies who have long since stepped forward in expansion for national defense production—such as is the case with many of the companies in our own industry. They are actually required to pay a price for having contributed the capital to anticipate the needs of the preparedness program. It is to be hoped that this blunder will in due time be recognized and corrected."

■ Construction of a $2,100,000 "blackout" factory for Grumman Aircraft Engineering Corp. has been started at Bethpage, Long Island, N. Y., by the Austin Co., Cleveland.

Grumman adopted a windowless design to make the building invisible from the air at night.

How Profits Tax Will Affect Selected Companies

	*Invested Capital 12/31/39	**Average Annual Earnings 1936-1939	8% of Invested Capital	1939 Net Income	Estimated 1940 Net Income	Estimated 1940 Excess Profits Tax
Allegheny Ludlum Steel Corp.	$27,108,505	$1,974,507	$2,168,000	$2,093,518	$4,000,000	$850,000
American Rolling Mill Co.	129,988,432	4,671,230	10,399,075	4,011,909	5,500,000	.....
Bethlehem Steel Co.	568,813,331	18,902,306	45,505,064	24,638,384	50,000,000	2,050,000
Crucible Steel Co.	103,132,714	2,485,670	8,250,617	2,803,596	6,500,000	.....
Inland Steel Co.	129,700,763	10,328,270	10,376,061	10,931,015	14,000,000	2,045,575
Jones & Laughlin Steel Corp.	193,597,401	3,146,175	15,487,792	3,188,944	9,500,000	.....
National Steel Corp.	169,929,778	16,847,168	14,394,382	12,581,635	16,500,000	201,835
Republic Steel Corp.	300,654,726	7,325,603	24,052,378	10,671,343	16,000,000	.....
Rustless Iron & Steel Corp.	5,549,592	558,957	443,968	1,090,876	1,500,000	438,495
United States Steel Corp.	1,423,058,000	46,661,912	113,848,000	41,119,934	100,000,000	.....
Wheeling Steel Corp.	97,731,000	3,601,941	7,816,000	5,560,753	4,500,000	.....
Youngstown Sheet & Tube Co.	191,039,826	6,439,908	15,283,186	5,004,484	6,000,000	.....

Note: Figures are from company reports to stockholders. Earnings reported to bureau of internal revenue are frequently calculated on a different base.

*Consists of stated value of common and preferred stocks, earned and capital surplus, and 50 per cent of funded debt.

**Exemption is 95 per cent of average earnings.

Compilation by Fenner & Beane, New York.

Daily Ingot Output at 90.7% in September

■ Daily average steel ingot production in September, at 90.75 per cent of capacity, was the highest since November, 1939, when 93.71 per cent was the operating rate. This compares with 89.72 per cent in August.

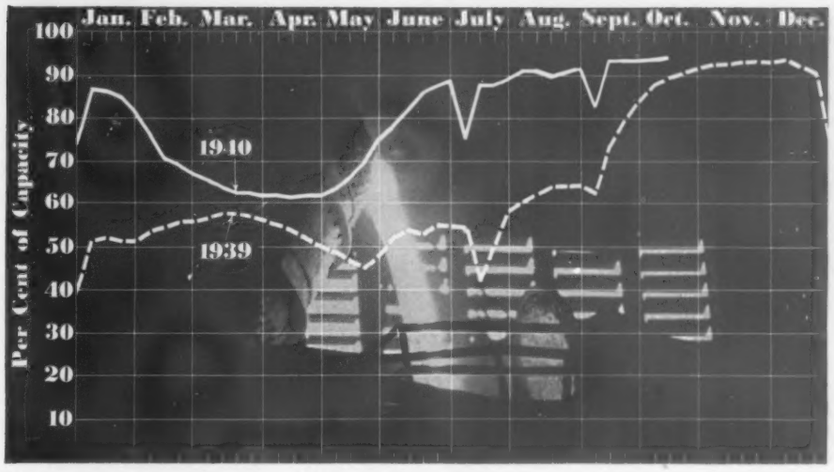
The American Iron and Steel Institute reports total output in September as 5,895,232 net tons, compared with 6,033,037 tons in August. In November, last year, 6,147,783 tons were produced.

The decline in total tonnage in September was due to one less day.

An illustration of the increase in steelmaking capacity over the past ten years is afforded by a comparison with May, 1929. For that month the industry averaged operations of 102.01 per cent of capacity, but tonnage produced—5,920,596 net tons—virtually coincides with the September, 1940, tonnage of 5,895,232 tons when the industry averaged only 90.75 per cent.

May, 1929, was the only month in the past 15 years when rated capacity was exceeded by actual production.

For the third quarter 1940, production totaled 17,523,339 tons, or 87.93 per cent of capacity, compared with 14,349,019 tons, or 72.66 per cent, for second quarter. For the first nine months of 1940 production was 46,201,463 tons, or 77.77 per cent, as against 33,535,012 tons, or 56.23 per cent, for the period in 1939.



PRODUCTION... Up

■ STEELMAKING operations last week increased 1 point to 94½ per cent, highest for the year and ½-point above the high point in 1939. Six districts made small gains and six were unchanged. Last year the rate was 89½ per cent; two years ago it was 51½ per cent.

Youngstown, O.—Average output last week was 88 per cent, up 3 points. The week started with 63 open hearths and five were added at midweek, two by Youngstown Sheet & Tube Co. and three by Republic Steel Corp. Schedule for this week is 90 per cent.

St. Louis—Steady at 82½ per cent, 21 open hearths in production.

Detroit—Up 2 points to 96 per cent. Continuance as close as possible to capacity is indicated.

Birmingham, Ala.—Held at 97 per cent for the fourth week.

Cincinnati—Pressure for delivery sustained operations at 90 per cent, with indications for continued production at this rate.

New England—Advanced 4 points to 92 per cent, two plants operating open hearths at 100 per cent.

Buffalo—Furnace repairs prevented expected production increase; rate remained 90½ per cent.

Central eastern seaboard—Rose 1 point to 93 per cent, with prospect of a small gain soon.

Pittsburgh—Up 1 point to 88½ per cent. A further increase is planned for this week.

Wheeling—Unchanged at 97 per cent for fourth consecutive week.

Chicago—Slight readjustments brought a rise of ½-point to 98 per cent. Three plants are operating above 100 per cent.

Cleveland—Unchanged at 88 per cent, all producers being practically at their highest point.

Steel Ingot Statistics

Period	Calculated Monthly Production—All Companies—Open Hearth—Net tons	Open Hearth—Per cent of capacity	Bessemer—Net tons	Bessemer—Per cent of capacity	Total—Net tons	Total—Per cent of capacity	Calculated Weekly production, all companies net tons	Number of weeks in month
1940 **Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.**								
Jan.	5,369,601	86.40	285,714	56.10	5,655,315	84.11	1,276,595	4.43
Feb.	4,203,508	72.37	205,527	43.19	4,409,035	70.16	1,064,984	4.14
March	4,073,196	65.54	191,559	37.62	4,264,755	63.42	962,699	4.43
April	3,798,371	63.11	176,335	35.76	3,974,706	61.04	926,505	4.29
May	4,582,694	73.74	258,709	50.80	4,841,403	72.00	1,092,867	4.43
June	5,228,529	86.88	304,381	61.72	5,532,910	84.97	1,289,723	4.29
July	5,272,708	85.03	322,362	63.44	5,595,070	83.40	1,265,853	4.42
Aug.	5,663,363	91.13	369,674	72.59	6,033,037	89.72	1,361,859	4.43
Sept.	5,530,044	92.10	365,188	74.22	5,895,232	90.75	1,377,391	4.28
9 mos.	43,722,014	79.63	2,479,449	55.11	46,201,463	77.77	1,180,416	39.14
1939 **Reported by Companies which in 1939 made 97.97% of Open Hearth and 100% of Bessemer.**								
Jan.	3,413,783	55.35	165,080	27.22	3,578,863	52.83	807,870	4.43
Feb.	3,149,294	56.55	219,621	40.10	3,368,915	55.07	842,229	4.00
March	3,621,177	58.71	217,950	35.93	3,839,127	56.67	866,620	4.43
April	3,122,418	52.27	230,356	39.22	3,352,774	51.11	781,532	4.29
May	3,104,697	50.34	190,467	31.40	3,295,164	48.64	743,829	4.43
June	3,314,012	55.48	209,868	35.73	3,523,880	53.71	821,417	4.29
July	3,308,029	53.75	256,798	42.43	3,564,827	52.74	806,522	4.42
Aug.	3,965,515	64.29	276,479	45.58	4,241,994	62.62	957,561	4.43
Sept.	4,436,792	74.45	332,676	56.77	4,769,468	72.87	1,114,362	4.28
9 mos.	31,435,717	57.89	2,099,295	39.31	33,535,012	56.23	859,872	39.00
Oct.	5,626,685	91.22	453,492	74.77	6,080,177	89.75	1,372,500	4.43
Nov.	5,694,788	95.34	452,995	77.12	6,147,783	93.71	1,433,050	4.29
Dec.	5,468,880	88.87	353,134	58.35	5,822,014	86.13	1,317,198	4.42
Total ...	48,226,070	66.43	3,358,916	47.05	51,584,986	64.70	989,355	52.14

The percentages of capacity for 1939 are calculated on weekly capacities of 1,392,331 net tons open hearth ingots and 136,918 net tons Bessemer ingots, total 1,529,249 net tons; based on annual capacities as of Dec. 31, 1938, as follows: Open hearth ingots, 72,596,153 net tons; Bessemer ingots, 7,138,880 net tons.

The percentages of capacity operated for 1940 are calculated on weekly capacities of 1,402,899 net tons open hearth ingots and 114,956 net tons Bessemer ingots, total 1,517,855 net tons; based on annual capacities as of Dec. 31, 1939 as follows: Open hearth ingots, 73,343,547 net tons; Bessemer ingots, 6,009,920 net tons.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Oct. 12	Change	Same week 1939	Same week 1938
Pittsburgh	88.5	+ 1	86	40
Chicago	98	+ 0.5	87.5	45.5
Eastern Pa. ...	93	+ 1	68	32
Youngstown ..	88	+ 3	94	51
Wheeling	97	None	93	54
Cleveland	88	None	90	56
Buffalo	90.5	None	88.5	49
Birmingham ..	97	None	90	57
New England..	92	+ 4	90	70
Cincinnati	90	None	86	70
St. Louis	82.5	None	74.5	48.5
Detroit	96	+ 2	98	77
Average	94.5	+ 1	89.5	51.5

See "Intense Industrial Activity", "Record Gas Consumption"

■ NATIONAL defense measures related to the gas utility industry dominated discussions at the twenty-second annual convention of the American Gas association, held last week at Atlantic City, N. J.

Various speakers pointed out that the industry is well qualified to play an important role in furthering rearmament, not only through the processing of metals, but also in aiding production of essential war materials, such as aviation gasoline and explosives.

Other subjects relating to the industrial and domestic use of natural and manufactured gas were considered at separate meetings of the association's different sections. Nearly 3000 executives and representatives of the gas industry from all parts of the country attended.

Good prospects for an extended period of intense industrial activity and record volume of gas consumption were indicated by several speakers. Total gas sales for the 12 months ended Aug. 1 were said to be 8.5 per cent ahead of the year before.

Co-operation Has Brought Progress

Wider availability of better steel, bronzes and other metals has resulted from co-operation between the gas industry and gas equipment manufacturers the past 20 years, it was stated by Franklin T. Rainey, retiring chairman, industrial gas section, and general sales manager, Ohio Fuel Gas Co., Columbus, O., in discussing the industry's part in national defense.

"We now have the inert atmosphere furnaces, with many types of atmospheres, which permit the maintenance of bright surfaces for metals, the reduction of surface oxides on metals and prevent decarburization, or softening, of metal surfaces," he pointed out. "There have also been developed furnaces for carburizing or hardening metal surfaces, using gas not only as the source of heat, but also as the hardening agent. In addition, there have been developed many types of continuous furnaces, with heat resisting alloy mechanisms for conveying materials through furnaces operating at high temperatures, under accurate temperature control, exact fuel proportioning, and producing definite results.

"Through these various combinations, there have been opened to gas new fields of chemical and physical application, aside from its use as a source of heat. All of this means a greater production of superior materials at less cost."

Various uses of gas in the melting and treating of materials for the production of munitions were described by Mr. Rainey. In discussing the manufacture of armor plate required in the modern tank, he stated that to have obtained in the last war the quality of armor plate demanded today would have required a heating cycle of 400 to 600 hours, whereas this heat treatment now can be accomplished in approximately 100 hours. The various heating operations involved in the production of a medium-size tank require about 500,000 cubic feet of manufactured gas or its equivalent.

H. Carl Wolf
President of the Atlanta Gas Light Co., who was elected chairman, Industrial Gas section, American Gas association

Touching on aircraft production, Mr. Rainey mentioned that a recent refinement in making propellers consists of taking rubber, impregnating it with nitrogen at extremely high pressures, and subjecting it to gas heat for several hours. This product is said to give better bite and better feathering action to the propeller, resulting in improved plane performance.

A process for liquefaction of natural gas was described by Dr. R. W. Miller and John A. Clark, Hope Natural Gas Co., Pittsburgh. The method involves a reduction in temperature to 250 degrees below zero and permits storage of the gas in liquid form in one six-hundredths its original space. Held in heavily insulated tanks the liquid gas may be revaporized into its original gaseous form when required by the application of steam. A plant to employ this process now is being built at Cleveland by the East Ohio Gas Co.

Post-war economic and financial readjustment will be the principal problem facing the United States should Germany be victorious in the European war, Dr. Harold G. Moulton, president, Brookings institution, Washington, declared. He expressed the view that there seems to be no sound basis for the fear that in the post-war period Europe's competitive position will have become stronger than United States'.

While there is fear that a German victory will destroy our export trade and flood our markets with goods produced by sweated labor in dictator countries, Dr. Moulton stated that our principal difficulties will arise from the restricted purchasing power resulting from the impoverishment of Europe and consequent lack of producing and buying power.

Dr. Moulton also indicated that the American economy need not be profoundly disrupted by the defense program; that the expansion in production required could largely be made by taking up the slack in the existing industrial system and that there is no underlying reason why a great distortion of commodity prices is necessary.

"Increased Efficiency" Is Solution

"If the national defense program is carried through without extensive industrial readjustments and without serious price distortions, post-war readjustments—so far as domestic factors are concerned—need present no serious difficulties . . . It may be recalled in this connection that the only serious problem at the end of the World war arose in connection with financial readjustments. The economic shortages resulting from the war period provided the basis for a great period of expansion just as soon as the financial readjustments had occurred.

"America's answer to post-war competitive problems must be increased efficiency. Both during the war and after, unceasing attention must be given to the problem of reducing the cost of production. By making prompt use of new scientific discoveries and inventions and by continuously installing more efficient plant and equipment, the United States will be able in the post-war period to produce on a lower cost plane than ever before."

A plan to establish an institute for fundamental research for the gas industry was presented by F. C. Smith, president, Houston Natural Gas Co., Houston, Tex. It is proposed that the institute be affiliated with an existing academic school. In addition to its study of research problems, the institute

also would serve to train man power for the gas industry.

Featuring the convention program of the industrial gas section was an informal round table discussion at the opening session. Substituted for a program of prepared talks, this round table provided an opportunity for industrial and commercial gas men and manufacturers to discuss sales and technical problems. Lawrence R. Foote, Central Illinois Electric & Gas Co., Rockford, Ill., presided.

A symposium was devoted by the industrial section to various aspects of gas in national defense. Speakers urged that the industry co-operate with metalworking companies engaging in production of munitions for the first time, by aiding them in selection and use of gas-fired equipment required in manufacturing processes.

Industry will be required to augment its personnel for war needs by between 5,000,000 and 7,500,000 workers, it was estimated in a talk by John H. Van Deventer, editor, *The Iron Age*. The supervisory forces and the skilled labor of this number must come largely from those now employed and will require a program of "upgrading" and executive training, he said, and while trade schools and other institutions under the United States office of education will furnish a portion of industry's requirements, the great bulk of the semiskilled labor supply must come from youths who have left school within the past five years and who have found it difficult to become permanently settled in jobs.

Recognition Awards Presented

H. Carl Wolf, president, Atlanta Gas Light Co., was elected chairman of the industrial gas section for the ensuing year, succeeding Franklin T. Rainey, Ohio Fuel Gas Co., Columbus, O.

Thomas J. Strickler, vice president and general manager, Kansas City Gas Co., was named president of the association. He succeeds Walter C. Beckford, vice president and general manager, Columbia Gas & Electric Corp., New York. George F. Mitchell, president, Peoples Gas Light & Coke Co., Chicago, was made first vice president, and George S. Hawley, president, Bridgeport Gas Light Co., was elected second vice president.

For contributing the best technical paper to meetings of the association the past year Raymond F. Hadley, electrical engineer, Susquehanna Pipeline Co., Philadelphia, was presented the Beal medal, highest technical recognition in the gas industry. Mr. Hadley's paper focused attention on a type of pipe corrosion involving anaerobic bacteria.

The Charles A. Munroe award for having made the most outstanding recent contribution toward the advancement of the gas industry was made to Herman Russell, president, Rochester Gas & Electric Corp., Rochester, N. Y., and a former president of the association. Honorable mention went to E. Carl Sorby, George D. Roper Corp., Rockford, Ill. W. E. Derwent, vice president, George D. Roper Corp., was elected president of the Association of Gas Appliance and Equipment Manufacturers, succeeding Frank H. Adams, vice president and general manager, Surface Combustion Corp., Toledo, O.

Industrial Safety Is Patriotic Duty, Chicago Convention Told

■ WITH "Safety for National Defense" as its theme, the twenty-ninth national safety congress at the Stevens hotel, Chicago, last week attracted 10,000 delegates and visitors. The congress, sponsored by the National Safety council, featured several sessions devoted to industrial safety.

In the annual presidential address, Col. John Stilwell, vice president, Consolidated Edison Co. of New York Inc., New York, warned that the United States is facing critical days and is menaced by enemies from without and within. He said "employers who are indifferent to conditions in their shops which lead to accidents and occupational diseases are giving aid to the enemy."

Changes in industrial operations, he continued, challenge ingenuity in preventing occupational accidents and diseases.

He stated that many industrial plants made gratifying progress in 1939. Average frequency rate for all plants reporting to the council decreased 5 per cent from 1938, and the severity rate was reduced 10 per cent. Compared with 1926, frequency showed a decline of 69 per cent and severity 50 per cent.

Installation of a safety program is a selling job in which workmen must be convinced their personal safety means as much to them as to the company, Peter E. Rentschler, president, Hamilton Foundry & Machine Co., Hamilton, O., told members of the metals section. "It is a very difficult selling job to educate the workman so that he will realize that the expenditures on the company's part must be augmented by his continuous voluntary assistance," he said.

"Three factors are important in building up employes' proper attitude toward a real safety program," declared T. C. Armstrong, supervisor, industrial relations, Westinghouse Electric & Mfg. Co., Springfield, Mass., also addressing the metals section. "First, every one must believe that the management is sincere in its safety program. Second, every person must have his opportunity to express his feelings about the policy. Third, his expression must be considered—and something done about it."

Walter S. Tower, president, American Iron and Steel institute, emphasized the progress in safety made by the steel industry. From near the bottom of the list when the safety movement started, the steel industry last year ranked fourth in the list of 30 industries covered in reports by the National Safety council.

Mr. Tower also took occasion to state the steel industry's capacity appears adequate for national defense, and export demand. A later amplification of his statement will be found on page 75.

Officers Elected

Colonel Stilwell was re-elected president of the council for a second one-year term. W. H. Cameron was re-elected managing director.

Walter S. Paine, manager, engineering and inspection department, Aetna Life & Affiliated Co.'s, Hartford, Conn., was elected vice president for industrial safety; and I. W. Millard, president, Industrial Gloves Co., Danville, Ill., vice president for finance, and treasurer.

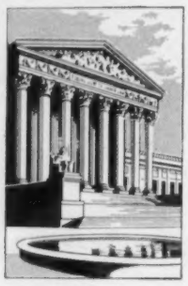
Named general chairman of the metals section was Irvin A. Brinkman, Mackintosh-Hemphill Co., Pittsburgh; and V. G. Pendleton, safety engineer, General Electric Co., West Lynn, Mass., to general chairmanship of the power press section.

Gear Sales Slightly Lower in September

■ September gear sales were 4.2 per cent lower than in August, but 45 per cent above those for September, 1939, according to the American Gear Manufacturers association, Wilkinsburg, Pa. The association's index stood at 183 in September, compared with 191 in August, and 126 in September, 1939.

For nine months this year the index averaged 140, or 46 per cent higher than for the first nine months last year when it averaged 96.

Windows of *WASHINGTON*



By L. M. LAMM
Washington Editor, STEEL

Knudsen Says NLRB Orders Not Key to Defense Awards.

Rearmament To Absorb 1941 Machine Tool Output.

Steel Products Inventory Index at 120.1 in August.

Bill Proposes Economic Defense Board.

WASHINGTON

■ WAR and navy department officials last week said they would not feel impelled to deny defense contracts to companies held in violation of the Wagner act, as implied by Attorney General Jackson's ruling that labor board orders were binding on other government agencies.

Amidst the angry criticism that followed his opinion, the attorney general himself hastened to say the interpretation that companies held in violation of the Wagner act must be denied contracts was "wholly erroneous."

"I did not say what has been read into it—that the effect is to withhold the award of contracts. If the national defense commission decides to deal with a man who has violated the act, this opinion has nothing to do with it," Mr. Jackson testified before the Smith committee of the house, set up to investigate the labor board's administration.

Robert P. Patterson, assistant secretary of war, said: "We don't make and we have not made the matter of prospective contractors' disputes with the labor board the determining element in the award of a contract. If the matter came to our attention, it would be only one of the factors to be taken into account."

Frank Knox, secretary of navy, concurred.

William S. Knudsen, defense commission, speaking before the annual meeting of the Army Ordnance association in New York, said anent the Jackson opinion:

"It was implied, or at least to many people it appeared to imply, that, if you were in violation of the national labor relations act before the courts said you were, you were out of luck as far as working for the government was concerned, and I think that's going too far.

"All of this is based on a statement by the commission that work carried on as part of the defense program should comply with federal statutory provisions affecting labor wherever such provisions are applicable. This means to me that when the courts have held that labor practices followed by a manufacturer violate the laws of the land, then, and only then, as a matter of policy only, defense contracts should not be given to that manufacturer until he changes his policies, and that's all it means to me.

"Certainly the defense commission has no authority and does not want to undertake the job of enforcing the labor laws."

•

Reports on the progress of and outlook for the national defense program were given the Army Ordnance association, meeting in New York last week, by three high defense officials: William S. Knudsen, defense commissioner; Maj. Gen. C. M. Wesson, chief of ordnance; and Robert P. Patterson, assistant secretary of war.

Highlights of their addresses: The defense program will absorb the machine tool industry's entire output in 1941, leaving no margin for civilian purchases except where there is dire need.

United States aircraft production is 16 to 20 per cent behind schedule.

Controls over industry, such as priority ratings for defense orders, may be invoked as tight spots develop in armament manufacture.

•

Index value of iron and steel products manufacturers' inventories for August was 120.1, compared with 119.1 in July and 102.3 in August last year, according to commerce department's August industry survey. The index was based on Dec. 31, 1938, as 100.

Index value of new orders received by iron and steel producers and manufacturers in August, with January 1939 as 100, was 139.7. This compared with 151.2 in July and 103.9 in August, last year.

With January 1939 as 100, index value of iron and steel products manufacturers' shipments in August was 163.2, compared with 146.3 in July and 127.8 in August last year.

There was an increase of 0.8 per cent in value of iron and steel products manufacturers' unfilled orders in August, compared to an increase of 8.9 per cent in July. Increase in August, compared with the month last year, was 77.2 per cent.

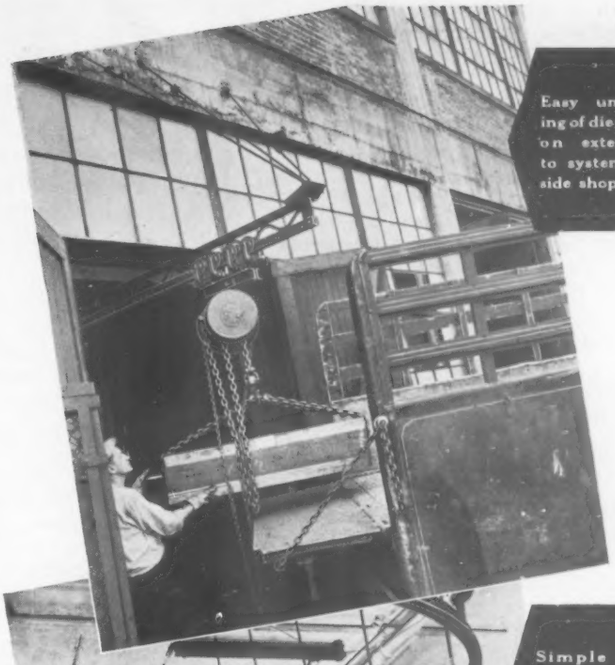
Department's survey for August reveals continued heavy volume of new orders placed during recent months provided for a 9 per cent rise in shipments over July. Deliveries equaled the high totals of last October and November.

Lack of general inventory accumulation in August indicates, survey points out, enlarged volume of shipments represents goods moving into consumption and distribution channels. This differentiates the present rise in industrial activity from that which occurred in fall of 1939. Although new-order index then ex-

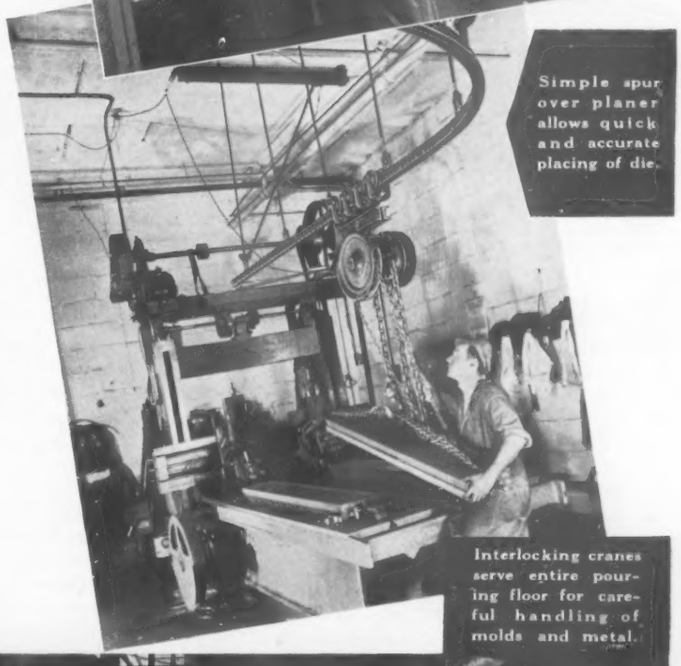
Simple Methods for stepping up Defense Production

With a surging demand for greater output, plants operating on defense materiel use every possible means to obtain it. It is no wonder that these plants are rapidly installing overhead handling equipment to relieve floor congestion...to gain time through process aids...or to conserve skilled manpower by eliminating handling fatigue.

Simple systems as shown here are quickly and inexpensively applied wherever a short cut is needed. American MonoRail engineers can spot these places in a short survey of your plant. They will then offer a detailed proposal which does not obligate you in any way. Why not give them a chance to help push along your defense production?



Easy unloading of die block on extension to system inside shop.



Simple spur over planer allows quick and accurate placing of die.

Interlocking cranes serve entire pouring floor for careful handling of molds and metal.

THE AMERICAN MONORAIL COMPANY

13102 Athens Ave. Cleveland, Ohio

ceeded the present level, volume of transactions was increased by purchase of semifinished goods for inventory accumulation.

Although shipments moved in increased volume, incoming business more than kept pace with delivery rate and there was a further rise in unfilled orders. August was fourth successive month in which backlog of unfilled orders in durable goods industries expanded; incoming orders set a high for the year.

Pronounced increases over July in new orders were reported by almost every durable goods group, outstanding exception being in iron and steel products, which recorded a decline of 8 per cent from July total.

Non-durable Goods Off

Incoming business in non-durable goods fell off slightly. While divergent seasonal influences tended to cancel changes in individual industries, margin of gain over the corresponding 1939 month was about 5 per cent in both July and August.

Unfilled order backlog for manufacturing industries in durable goods, excluding aircraft and shipbuilding where unfilled orders are at record levels, increased 10 per cent in August, expanding total to almost 40 per cent above the year's low, last April. At the end of August unfilled orders were about 80 per cent greater than just prior to outbreak of war last year.

Outstanding were new order backlogs of the machinery industry. Unfilled orders in electrical machinery rose 20 per cent while manufacturers of other machinery reported an 8 per cent advance. Total backlog for each of these groups was more than double August, 1939, figure.

Virtually every durable goods industry, with exception of the automobile group, reported an increased rate of shipment in August. Iron and steel products, advancing almost 12 per cent from July, was outstanding. Shipments for other durable goods, lumber, furniture, stone, clay and glass products, and nonferrous metals industries, advanced to a new high for 1940.

Shipments of non-durable goods industries were also at a high for the year, with every industry group except paper products recording gains over July. Seasonal factors were partly responsible for the high shipment rate.

SHELL FORGING PLANT TO BE BUILT AT GADSDEN, ALA.

War department has announced selection of Gadsden, Ala., as a site for a shell forging and machining plant. Army agents have been ordered to Gadsden to purchase approximately 150 acres of land for this purpose.

Plant will be owned by the government and operated by the Landsdowne Steel & Iron Co., Morton, Pa. Negotiations for construction of the plant are in progress.

DISSTON WILL DOUBLE ARMOR PLATE CAPACITY

War department has announced a contract to provide increased facilities for manufacturing armor plate has been awarded to Henry Disston & Sons Inc., Philadelphia.

Contract involves an addition to the present Disston plant on land now owned by the government, which will more than double present capacity. Title to the addition and equipment will remain with the government, and the plant will be operated by Disston.

Cost of the plant and equipment will be $1,018,400. Plant will be constructed by Barclay White & Co., Philadelphia. The architect and engineer will be the Irving S. Towsley Co., Philadelphia.

177,000 SKILLED WORKERS LISTED ON STATE ROLLS

One hundred seventy-seven thousand job seekers qualified for work in a partial list of 270 skilled occupations essential to defense industries were registered in state employment offices Aug. 31, according to Paul V. McNutt, federal security administrator. In addition, 38,000 workers were qualified for jobs in these occupations although not particularly skilled.

Largest group, 67,000, were qualified for work in machine shops and in the operation of machine tools. Relatively few were listed as qualified for work in the aircraft and shipbuilding industries.

In order of size the five most numerous occupations found were: (1) Automobile mechanics; (2) machinists, millwrights and maintenance mechanics; (3) welders; (4) form builders; (5) electricians. Comparatively few were registered as die designers and setters, tool inspectors, loftsmen, patternmakers, and in those occupations needed in the production of firearms and munitions.

ROCKEFELLER NAMES AIDES TO CO-ORDINATION STAFF

Nelson A. Rockefeller, co-ordinator of commercial and cultural relations between American Republics, has announced appointment to his staff of James W. Young and John Hay Whitney.

Mr. Young, director, bureau of foreign and domestic commerce, department of commerce, will serve as director, division of communications, in the office of co-ordination. A former official of J. Walter Thompson Co., New York, Mr. Young has been serving as assistant in the raw materials division, national defense advisory commission. In his new post, he will have supervision of radio, press and motion picture programs, office of co-ordination.

Mr. Whitney, motion picture executive and chairman, Freeport Sulphur Co., New York, will assist Mr. Young as director of the motion picture division.

ECONOMIC DEFENSE BOARD PROPOSED IN HOUSE BILL

Economic defense board with broad functions in tariff regulation and foreign commerce is provided in a bill introduced in the house by Representative Roy O. Woodruff, Michigan.

Bill provides for creation of an economic defense board of six members to replace the United States tariff commission as now constituted, transfer to the board of functions exercised by the tariff commission, and consolidation under the new economic defense board of foreign trade and financial activities of the federal government now carried on in many scattered agencies and establishments. Among its provisions in this latter connection is one providing the chairman of the economic defense board be chairman ex-officio of the board of trustees. Export-Import Bank of Washington.

Board would possess tariff commission's authority to recommend to the President that tariff duties be raised or lowered not to exceed 50 per cent, to equalize difference between landed cost of foreign imports and reasonable selling price of similar or competing articles in United States; to arrange barter transactions with foreign nations to dispose of surplus commodities; and to assist the President in negotiation of future trade agreements.

Bill further provides for termination of the present trade agreement authority, and the agreements negotiated under it and requires future trade agreements be submitted for congressional approval before they become effective, and that they be based on the conditional most-favored-nation principle.

$45,762,500 ALLOCATED FOR ARMY HOUSING PROJECTS

Announcement of an allocation to the public buildings administration of $45,762,500 for defense housing projects for the army was made recently by Federal Works Administrator John M. Carmody.

Allocation, which will provide a minimum of 13,000 dwelling units, was made after secretary of war had requested the federal works agency to carry out the program under the army's share of $100,000,000 provided for defense housing in the second supplemental national defense appropriation act.

MEN of INDUSTRY

■ HARVEY WILSON, formerly in charge of the Philadelphia sales office of Babcock & Wilcox Tube Co., New York, has been transferred to New York as district sales manager. He will also have jurisdiction over the Philadelphia sales office, to which office R. M. Lackner has been transferred from Detroit. B. F. W. Seaburn has been placed in charge at Detroit, having been transferred from the Beaver Falls, Pa., district sales office.

♦

Lyle C. Harvey, president and general manager, Bryant Heater Co., Cleveland, a subsidiary of S. R. Dresser Mfg. Co., Bradford, Pa., has been elected a director of the parent company.

♦

J. T. Sutliff, many years associated with Roots-Connersville Blower Corp., Connersville, Ind., has been placed in charge of the company's Chicago office. He succeeds the late William Townsend. E. A. Coons will assist Mr. Sutliff.

♦

Dr. Claude L. Clark, formerly of the department of engineering research, University of Michigan, has joined the metallurgical staff, Steel and Tube division, Timken Roller Bearing Co., Canton, O., as metallurgical development engineer.

♦

R. F. Pearson has been appointed district sales manager at New York for Follansbee Steel Corp., Pittsburgh. For several years he has been United States representative for Richard Thomas & Co., Welsh tin plate manufacturer.

♦

R. C. Stanley, chairman and president, International Nickel Co. of Canada Ltd., has been named by the American Institute of Mining and Metallurgical Engineers to receive the first award of the Charles F. Rand gold medal for distinguished achievement in mining administration.

♦

H. J. Barton has joined the tool steel division of Allegheny Ludlum Steel Corp., Pittsburgh, and will be located in the southern California territory. Mr. Barton has been associated with steel activities on the Pacific coast many years, specializing in the sale of tool, alloy and special steels, and until his appointment with Allegheny Ludlum, served as an official and sales manager of Earle M. Jorgensen Co. 15 years.

♦

Joseph Michaels, president and one of the founders of Hyman-Michaels Co., Chicago, will be honored at a dinner in Congress hotel, Chicago, Oct. 21, on his fiftieth anniversary in the scrap iron business. Invitations have been issued by the company to members of the Chicago chapter, Institute of Scrap Iron and Steel, and neighboring friends.

♦

Roger H. Clapp, formerly Philadelphia branch manager, John A. Roebling's Sons Co., Trenton, N. J., and associated with the company since 1936, has been transferred to

Roger H. Clapp

Trenton as assistant general manager of sales.

♦

Walter J. Kelly has been appointed acting manager of industrial relations, Tennessee Coal, Iron & Railroad Co., Birmingham, Ala., and John H. Williamson has been named acting assistant manager of industrial relations. Mr. Kelly succeeds J. F. Vance, who, although retiring from active service, will continue to serve the company in an advisory capacity.

♦

Harry J. Starke has been appointed sales representative, William Jessop & Sons Inc., Chicago. He will assist Thorvald L. Haines, district manager.

♦

Walter J. Curley, president, Pennsylvania-Conley Tank Car Co., Pittsburgh, has been elected a director of McKeesport Tin Plate Corp.

♦

C. Milton Ekberg, of the sales engineering department, Norton Co., Worcester, Mass., has been named field engineer in the Chicago district, and William A. Russell has been made field engineer in the Pittsburgh territory. Alden P. Johnson, also a member of the company's sales engineering department, has been transferred to South Bend, Ind., as a salesman assisting J. B. Eckstedt, while J. L. deVou, who has been engaged in field engineering work in the Chicago and Cleveland districts, has been appointed a salesman, with headquarters in Toledo, O., assisting R. H. Cannon.

♦

C. B. Cramer has been made direct factory representative of the Plymouth Locomotive Works, division of Fate-Root-Heath Co., Plymouth, O. Mr. Cramer will cover the St. Louis territory, including Missouri, Kansas, Oklahoma, Arkansas, Nebraska, Iowa and parts of Illinois, Tennessee and Alabama. His office will be at 4620 McPherson avenue, St. Louis.

♦

Herman C. Bellinger, vice president in charge of operations, Chile Exploration Co., subsibiary of Anaconda Copper Mining Co., has been named the William Lawrence Saunders gold medallist for 1941, for his achievements in mining, by the American Institute of Mining and Metallurgical Engineers. The medal will be presented to Mr. Bellinger at the annual meeting of the institute in February, 1941.

♦

Howard L. Dingler has been appointed chief purchasing agent for the Chevrolet gear, axle and forge divisions, Detroit, succeeding B. D. Taliaferro, who has resigned. Mr. Dingler was first associated with Chevrolet in New York, in 1916, in the traffic department, continuing in that capacity until 1929 when he was named material supervisor in the central office at Detroit. In January of this year he became assistant purchasing agent at Chevrolet central office.

♦

J. W. Doody and Ray D. Mack have been placed in charge of the branch office recently established by Carboloy Co. Inc., Detroit, at 5905 Pacific boulevard, Huntington Park, Los Angeles. Mr. Doody has represented Carboloy on the Pacific coast the past ten years, while Mr. Mack was formerly service engineer for the company in the Wisconsin territory. Frank Staroba, heretofore representative for Carboloy in Missouri, succeeds Mr. Mack in the Wisconsin area, and E. Monacelli, recently in the Chicago area, is now in charge of the Missouri and southern district.

WHEN PRECISION GUARDS PRECISION

It is an old saying that "it's a poor workman who blames his tools". But shop foremen know that even the best operator cannot turn out precise and well finished work on a lathe with worn or faulty headstock gears.

To make sure of maintained accuracy at this vital spot, a well-known lathe maker has standardized on carburized Nickel-Molybdenum steels — using SAE 4815 for drive gears and SAE 4615 for the transmission gears.

These two Molybdenum steels, in addition to having the requisite core strength and toughness, carburize to 55-60 Rockwell "C" with minimum distortion. Consequently proper initial adjustment is simple and freedom from trouble due to worn teeth is assured for an extended service period. Thus precision guards precision for years.

Rechecking your own specifications may disclose opportunities for increasing serviceability of the product by a change in materials. You will find our book, "Molybdenum in Steel", helpful. It is sent free on request.

PRODUCERS OF MOLYBDENUM BRIQUETTES, FERRO-MOLYBDENUM, AND CALCIUM MOLYBDATE

Climax Mo-lyb-den-um Company
500 Fifth Avenue · New York City

MOLY

Mirrors of *MOTORDOM*

By A. H. ALLEN
Detroit Editor, STEEL

Detroit Worried Over "Distant Economic Collapse".

Will It Hit Stocks, Bonds, Real Estate, or What?

Sloan Sounds Solemn Note on the Financial Side.

Conscription's Effect on Sales? Probably Light.

New Car Prices Up 2 to 5 Per Cent.

DETROIT

■ REVIEWING economic aspects of the national defense program in a message to stockholders, Alfred P. Sloan Jr., chairman of General Motors, indicates that the automobile industry has pledged its active co-operation to the development of improved manufacturing methods for defense equipment. He sounds a solemn note on the financial side, declaring that "materials for defense do not add to the standard of living of the people. The production of such materials may create employment, but devoting labor and materials to defense means less labor and materials available for the production of goods suitable for consumption, and every dollar so spent means less for some people somewhere sometime."

"It is perfectly evident," continues Mr. Sloan, "that spendable income as a whole must be seriously prejudiced over the business cycle by the fact that a defense program has become essential. This is all entirely aside from the further fact that too little attention is always paid to the inevitable readjustment that must come after such a period of artificial expansion. If to the inevitable results of artificially stimulated production there should be added the further destructive influence of price inflation, the aftermath and consequent readjustment will be correspondingly severe."

This is expressing it most delicately, to say the least. Right now, a good many business men around Detroit are cudgeling their brains to figure out just how to prepare for the terrific economic collapse they feel sure is not more than three or four years distant. The problem is to determine what is going to be worth anything at that time—stocks, bonds, real estate, tangibles, cash or whatnot?

Regarding new facilities for the defense program, Mr. Sloan points to the common misunderstanding regarding production equipment. Created for a special purpose, it is seldom adaptable to other needs.

Unusable Surpluses

"This may result," he says, "from either the character or the quantity of such equipment, or from both. For instance, plants and tools to meet the demand of accelerated and expanded defense schedules are required in quantities that cannot possibly be utilized in later peacetime operations except perhaps in part and even then over a long period of time. Thus unusable surpluses are created. To these surpluses are added quantities of machines for making special items which have practically no usefulness and little conversion value once the emergency has passed.

"In other words, lack of usable value will render invalid the investment by industry in substantial quantities of costly equipment. This cannot be avoided. It is inherent in the problem. Furthermore, it must be appreciated that industrial management acts as trustees. They cannot use the property under their control without due regard to the element of trusteeship. They are not in position in effect to donate stockholder funds even to a public cause."

Considerable apprehension has been expressed over the effect of conscription of young men for the army may have on automobile sales. With conscription day this Wednesday, a calm appraisal of the probable results shows earlier fears to have been overdrawn. D. U. Bathrick, general sales manager of Pontiac, estimates conscription may place 6 per cent of prospective buyers in service which would mean that a dealer who sells 200 cars a year would lose 12 sales, or one a month. He feels that increased industrial activity resulting from the defense program will be translated into more employment and more money in circulation to the end that four new sales will be created for every sale lost because of the draft.

Only 15 per cent of transactions now on the books of leading finance companies cover purchases by men between the ages of 21 and 31. Half of this group are married men or have other dependents. Another 7 or 8 per cent will be disqualified because of physical defects. Calculations by finance companies show that only 75 automobile installment purchases out of each 1000 may be affected technically by conscription. This explains why many dealers now are offering guarantees of cash refunds to car buyers who may be conscripted.

■ TREND of prices for new cars, as indicated here previously, is upward, advances being on the order of 2 to 5 per cent. Nash was the exception to the rule, announcing prices on its regular series of cars $70 to $159 lower. It is interesting to tabulate the prices on the least expensive model in each maker's line—business coupes—and to observe how closely packed the en-

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tire industry now stands. As a matter of fact, the expression "low-price field" does not mean much any more, since there has been a price movement downward among the higher-price cars, while the erstwhile low-price cars have gradually crept up toward the rest. Here are factory delivered prices, calculated in some cases, for all except Willys, Hudson, Graham, Hupmobile and Crosley:

Plymouth	$685
Studebaker Champion	690
Ford	695
Chevrolet	712
Nash 600	731
Dodge	825
Pontiac	828
Oldsmobile	852
Packard	867
De Soto	898
Mercury	915
Nash (regular)	923
Buick	935
Chrysler	945
Studebaker (regular)	970
Cadillac	1345
Lincoln Zephyr	1430

■ AMONG engineering improvements effected in the 1941 Olds models are six which are worthy of particular mention, as outlined by Harold T. Youngren, chief engineer. First, rear axle insulators are now of the spool type, mounted fore and aft of the axle housing to provide better control. Former design was a metal-backed clamp around the axle housing.

Second, on the matter of 6 and 8-cylinder engine interchangeability, chassis have been designed so that the same frame and sheet metal parts can be used, whether mounting a 6 or an 8. The radiator core is mounted on the front face of the radiator core support when the 8 engine is used, and on the rear face for the shorter 6 engine. Front engine mounting is also located at the forward side of the frame front cross member, or at the rear, depending upon which engine is used.

Safety clevis connection is used on the brake pedal, comprising the conventional pedal with an added "duckbill" pointing to the rear at the pedal clevis connection and a stamped end on the master brake cylinder pushrod which hooks under the duckbill in such a manner as to prevent the rod end being lifted vertically from the pedal until the master cylinder end of the rod is raised to unhook the stamped end from the pedal.

Chassis wiring has been redesigned to include a remote-type dash mounted lighting switch with grouped "plus-on" connectors which simplify assembly, provide greater accessibility and relieve wiring congestion behind the dash.

Cylinder heads have a groove extending lengthwise of the top through the spark plug wells to drain off water which might otherwise accumulate around the plugs, thus minimizing the possibility of their being shorted by water.

Carburetion has been improved by the addition of a ⅜-inch bakelite insulator between the throttle body and bowl casting, providing better heat insulating characteristics for improved handling of hot fuels.

Despite the fact new models are rolling from assembly lines at a better than 100,000-per week clip parts suppliers in many cases are still receiving design changes which will require weeks to complete. For example, one of the large die castings suppliers reports receipt of die changes which will require four weeks to make. Such last-minute changes, while probably made for perfectly good reason, are particularly annoying to parts companies, especially in the case of die castings where a die change may have to be made by welding onto a carefully finished die, with no assurance the weld will not pit or possibly strip off during the production of castings.

Packard engineers claim 48 "firsts" contributed to motor car design by Packard since 1899. They include selective gearshift with H-movement; hooking of accelerator pedal and hand throttle, first straight-eight L-head engine, first to provide four-wheel brakes as standard equipment, and first to use water temperature indicator as standard. Two innovations in the Packard line for 1941 are the hydraulic window regulators supplied on 180 models and described in detail in these columns several months ago, and the electromatic clutch.

With the latter device the clutch is engaged or disengaged in accordance with driving requirements by a vacuum cylinder which is actuated by vacuum from the intake manifold and which is connected to the clutch release mechanism in a manner that avoids movement of the clutch pedal during automatic operation. A solenoid operated control valve, located in the vacuum line, makes the unit operative or inoperative at the will of the driver through the medium of a switch on the instrument panel.

Engagement or disengagement of the clutch is controlled primarily by the accelerator pedal, the clutch disengaging when the pedal is released and engaging when the accelerator pedal is depressed. A system of solenoids, solenoid switches and relays is provided to actuate the clutch. A governor switch prevents clutch release in high gear above 12 miles per hour, so that the motor may be employed as a brake when decelerating. Conventional gearshift lever on the steering column and the clutch pedal are retained, the lockout switch on the dash providing for manual or automatic clutch operation.

Automobile Production

Passenger Cars and Trucks—United States and Canada

By Department of Commerce

	1938	1939	1940
Jan.	226,952	356,692	449,492
Feb.	202,597	317,520	422,225
March	238,447	389,495	440,232
April	237,929	354,266	452,433
May	210,174	313,248	412,492
June	189,402	324,253	362,566
July	150,450	218,494	246,171
Aug.	96,946	103,343	89,866
8 mos.	1,552,897	2,377,691	2,875,477
Sept.	89,623	192,678	.....
Oct.	215,286	324,688	.....
Nov.	390,405	368,541	.....
Dec.	406,960	469,120	.....
Year	2,655,171	3,732,608	.....

Estimated by Ward's Reports

Week ended:	1940	1939†
Sept. 14	66,615	42,445
Sept. 21	78,820	55,350
Sept. 28	95,990	64,365
Oct. 5	105,153	76,095
Oct. 12	107,957	75,860

†Comparable week.

Insist on Free Enterprise

C. Scott Fletcher, sales manager of Studebaker, in a recent address before the Farm Equipment institute in Chicago, urged that business men cease asking for special privilege of any kind from local, state or national governments. He stated, "When the business man requests special privilege, he attacks free enterprise. To attack free enterprise is an act of treachery and business suicide as well, because every request for special privilege is an invitation to government control and no business can long survive bureaucratic domination. . . . Let us go to the government for one purpose only—to insist that free enterprise be kept free."

As a start on the huge job of staffing the three new plants being erected here for manufacture of tanks and airplane engines, key men in automotive divisions—foremen, assistant foremen, supervisors and superintendents, are being selected with a view to transferring them to the new plants as a nucleus of a trained working force. While this is a reasonable method of approach, the reaction of such men selected in many cases has been discouraging. They prefer not to be transferred to war work, because they feel it is just a temporary proposition and when terminated may find them out of a job entirely.

1929—DIE CASTINGS—1940

THIS DIE CASTING WAS OUTSTANDING IN **1929**

—THIS IS NOT UNUSUAL IN **1940**

—ANNUAL EXHIBITS ACT AS BAROMETER OF PROGRESS

The first exhibit of ZINC Alloy Die Castings—at the 1929 National Metal Exposition—featured a casting that was considered outstanding because of its thin sections and complexity of design. This casting, a radio chassis, proved to be the first of an ever increasing number of complex ZINC Alloy Die Castings which have been revolutionizing product design.

Developments in alloys, die casting equipment, and design technique, in the years since 1929, have made it possible to produce castings with the characteristics of the automatic phonograph grille shown here. This die casting measures 24⅝ x 12½ inches, and boasts wall thicknesses of .0625 inch — *5 times the size and half the thickness* of the radio chassis outstanding 11 years ago. The grille will be a feature of the die casting exhibit at this year's National Metal Exposition.

VISIT BOOTH D-8 NATIONAL METAL EXPOSITION Cleveland Public Auditorium OCT. 21-25

Complexity of design and thin sections are only 2 of the many qualities of ZINC Alloy Die Castings. If you cannot come to the National Metal Exposition, and would like to know more about this modern metal and method of parts production, consult any commercial die caster—or write to The New Jersey Zinc Company, 160 Front St., New York City.

ZINC ALLOY DIE CASTINGS

The Research was done, the Alloys were developed, and most Die Castings are made with

HORSE HEAD SPECIAL (99.99+% Uniform Quality) ZINC

Canada To Build Engine, Plane Plants; Nickel Output at Peak

TORONTO, ONT.

■ CANADIAN department of munitions and supply will erect an aircraft plant at Sea Island, Vancouver, B. C., to manufacture training planes. Plant will cost $1,500,000 and will be operated under direction of Boeing Aircraft Co., Seattle.

Government also is planning an aircraft engine plant to manufacture a British-type engine. Officials expect the plant will be in production before year's end.

Nickel production in Canada in 1939 reached an all-time record at 226,105,738 pounds, compared with 210,572,788 pounds in 1938 and 224,905,046 pounds in 1937, the previous record.

Canada Car & Foundry Co. Ltd., Montreal, has been awarded an order for 1500 propeller hubs and 1000 propeller shafts to cost $2,500,000. Other war orders last week aggregated $10,533,081, of which $1,219,362 were placed in the United States. Orders include:

Dockyard supplies: T. McAvity & Sons Ltd., Saint John, N. B., $7722; Dominion Engineering Co. Ltd., Lachine, Que., $25,435; Canadian Car & Foundry Co. Ltd., Montreal, $10,563; Canadian John Wood Mfg. Co. Ltd., Toronto, $13,013; Horton Steel Works Ltd., Toronto, $25,230; Dominion Chain Co. Ltd., Niagara Falls, Ont., $35,060; Anthes-Tait Foundry Ltd., Vancouver, B. C., $5080.

Mechanical transport: Messrs. A. Sicard Ltd., Montreal, $737,815; International Harvester Co. of Canada Ltd., Ottawa, $35,615; Ottawa Car & Aircraft Ltd., Ottawa, $19,408; Ross Cycle & Sports, Toronto, $156,030; Chrysler Corp. of Canada Ltd., Windsor, Ont., $40,750; Ford Motor Co. of Canada Ltd., Windsor, $36,349.

Aircraft Supplies: Canadian Vickers Ltd., Montreal, $23,709; Walter Kidde & Co., Montreal, $10,194; Noorduyn Aviation Ltd., Montreal, $94,873; Ontario Hughes-Owens Co. Ltd., Ottawa, $18,981; National Steel Car Corp. Ltd., Malton, Ont., $9563.

Electrical equipment: Canadian Marconi Co., Montreal, $76,367; Robert Mitchell Co. Ltd., Montreal, $8820; Northern Electric Co., Ltd., Ottawa, $898,093; Service Lamp Co. Ltd., London, Ont., $15,814; Northern Electric Co. Ltd., Vancouver, B. C., $7970.

Machinery: Canadian Ingersoll-Rand Co. Ltd., Montreal, $8546; Darling Brothers Ltd., Montreal, $10,374; Rudel Machinery Co. Ltd., Montreal, $33,276; Williams & Wilson Ltd., Montreal, $38,668; Canadian Fairbanks-Morse Co. Ltd., Ottawa, $34,149; Canadian Longyear Ltd., North Bay, Ont., $15,586; Smith & Traverse Co. Ltd., Sudbury, Ont., $10,558; Boylen Brothers Drilling Co. (Eastern) Ltd., Port Arthur, Ont., $48,897.

Ordnance: Small Arms Ltd., Toronto, $3,000,000.

Munitions: Air ministry, England, $10,800; J. Eveleigh & Co. Ltd., Montreal, $7968; MacDonald Mfg. Co., Toronto, $13,751.

Miscellaneous: Castle & Son Ltd., Montreal, $13,500; D. Kemp Edwards Ltd., Ottawa, $6600; General Steel Wares Ltd., Ottawa, $6285; General Wood Products, Bowmanville, Ont., $8424; Thomas Organ & Piano Co. Ltd., Woodstock, Ont., $11,534; Hill-Clark-Francis Ltd., New Liskeard, Ont., $32,400; Veterans Workshops Ltd., Regina, Sask., $26,967; Alberta Boc Co. Ltd., Calgary, Alta., $11,016; Vancouver Trunk & Bag Ltd., Vancouver, B. C., $11,923; Duplate Safety Glass Co., Ottawa, $44,310; Coulter Mfg. Co. Ltd., Oshawa, Ont., $29,844; Metal Stampings Ltd., Toronto, $42,000; Berkel Products Co. Ltd., Toronto, $13,332; Woods Mfg. Co. Ltd., Ottawa, $45,144; S. S. Holden Ltd., Ottawa, $37,620; air ministry, England, $6172; British admiralty, England, $13,500.

Construction projects: Alex I. Garvock, Ottawa, $108,013; Canadian Comstock Co., Toronto, $100,000; Geo. C. Abbott & Co., Toronto, $90,000; Iron Fireman Mfg. Co., Toronto, $31,000; Partridge Halliday Ltd., Edmonton, Alta, $98,000; Municipal Spraying & Contracting Co., Halifax, N. S., $130,000; Waterman, Waterbury Co., Regina, Sask., $80,000; City of Calgary Contractors, Calgary, Alta., $58,000; Armstrong Brothers, Brampton, Ont., $81,000; Fundy Construction Co., Halifax, N. S., $395,000; J. H. Ashdown, Calgary, Alta., $75,000; Laviolette Construction Co., Three Rivers, Que., $35,000.

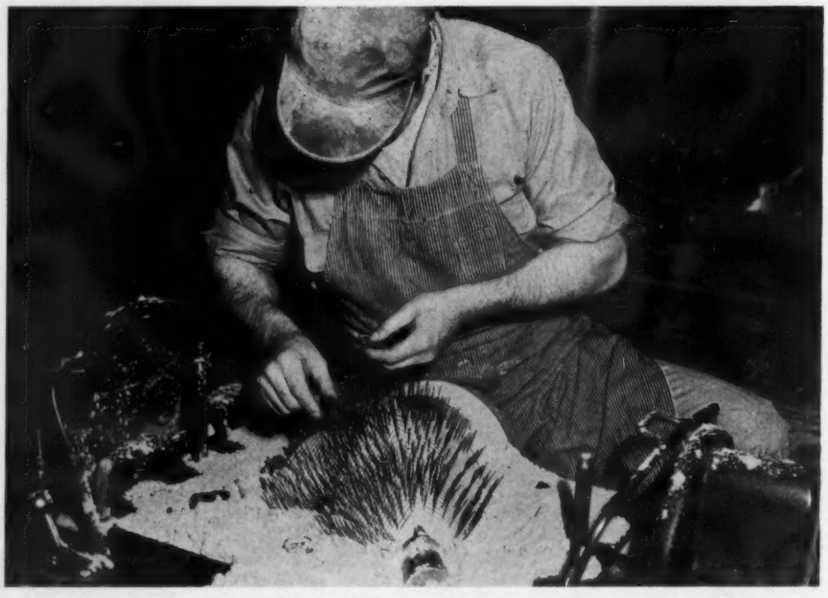
■ Tin plate and terne plate production showed a decrease of 5.6 per cent in 1939, compared with 1937, the bureau of the census reports in its biennial census of manufactures. Combined output of the two products in 1939 was 5,711,326,129 pounds, compared with 6,049,851,997 pounds in 1937. The 1939 total included 5,121,442,997 pounds of tin plate and 589,883,132 pounds of terne plate.

World Tin Production Increased 46 Per Cent

■ World production of tin in August, 1940, is estimated at 19,100 gross tons, compared with a revised figure of 19,900 tons in July, according to the International Tin Research and Development council, Greenford, Eng. Production in the first eight months this year is reported as 144,600 tons, or 46 per cent more than 87,300 tons in the corresponding period in 1939.

Deliveries to the U. S. totaled 70,404 tons in the first eight months, a gain of 69 per cent over 41,570 tons delivered in the same period of 1939. World stocks, including smelters' stocks and carryover, increased 2402 tons during August, to 51,232 tons at the end of the month. Stocks at the end of August, 1939, were 34,608 tons.

1500 Nails in Mold for Aircraft Engine Head



■ This porcupine-like object is a sand mold for a cylinder head casting in the early stages of manufacture in the new line-production foundry of Wright Aeronautical Corp., Fairlawn, N. J.

The molder deftly inserts over 1500 nails in the thin sections of the sand mold to prevent disintegration or breakage during the pouring operations, a practice that has enabled the company to produce cylinders with cooling fins over 2 inches in depth for Cyclone aircraft engines of 1200 to 2000 horsepower.

The foundry is devoted exclusively to molding and casting aluminum alloy cylinder heads and supplements Wright's main foundry, at Paterson, N. J. The company's manufacturing facilities in the Paterson area have been more than doubled in the past year; personnel increased from 5000 to 13,000.

Army, Navy Award Defense Contracts Totaling $299,793,027

■ CONTRACTS announced by the army and navy departments last week, principally for defense supplies, aggregated $299,793,027.17. Outstanding award reported was $178,782,732.34 to Douglas Aircraft Co. Inc., Santa Monica, Calif., for airplanes. Ordnance awards continued heavy and the navy department's bureau of supplies and accounts' purchases likewise remained a strong factor.

War department announced the following contracts:

Bartholomew Construction Co. Inc., Dallas, Tex., sewage treatment plant, Ft. Benning, Ga., $59,250.
Fred J. Brotherton, Hackensack, N. J., temporary housing, Ft. Monmouth, N. J., $161,529.
A. L. Coupe Construction Co. Inc., Louisville, Ky., recreation building, Ft. Knox, Ky., $50,879.
Economy Plumbing & Heating Co., Chicago, boiler house, Chanute field, Illinois, $118,702.
Haines & Haines, Dowagiac, Mich., gasoline stations, Ft. Custer, Mich., $39,900.
A. J. Honeycutt, Birmingham, Ala., temporary housing, Elgin field, Florida, $137,200.
John T. Maple, Fairbury, Ill., electric distribution and street lighting system, electric service and control equipment for deep well pumps, Chanute field, Illinois, $43,500.
Randall Construction Co. Inc., Amarillo, Tex., addition to radio operations building, English field, Amarillo, $2145.
Robert McCarthy, San Francisco, temporary warehouse, Letterman general hospital, California, $11,918.
A. D. Schader, San Francisco, standard gage railroad, Muroc bombing range, Muroc lake, Calif., $63,400.
Street Lighting Service Co., Chicago, electric distribution system, Scott field, Illinois, $9900.
Wesley Construction Co., Atlanta, Ga., rostrum enclosing wall, Andersonville National Cemetery, Ga., $13,558.
Wininger Bros., Safford, Ariz., drilling well, Ft. Huachuca, Ariz., $7900.

Quartermaster Corps Awards

Fargo Motor Corp., Detroit, trucks, $159,313.80.
Gillette Safety Razor Co., Boston, safety razors, $92,940.
Reo Motor Car Co., Lansing, Mich., trucks, $84,540.

Signal Corps Awards

American Automatic Electric Sales Co., Chicago, telephone equipment, $54,804.72.
Gar Wood Industries Inc., Detroit, reel units, $191,817.
Leach Co., Oshkosh, Wis., reel units, $150,900.

Aircraft Awards

Douglas Aircraft Co. Inc., Santa Monica, Calif., airplanes, $178,782,732.34.
Fairchild Engine and Airplane Corp., Ranger Aircraft Engines division, Farmingdale, L. I., aeronautical engines, $196,725.

Ordnance Department Awards

Allegheny Ludlum Steel Corp., Watervliet, N. Y., steel rods, $144,866.50.
American Brake Shoe & Foundry Co., Chicago, ammunition components, $440,000.
American Chain & Cable Co. Inc., Wilkes Barre, Pa., cables, $66,147.84.
Associated Spring Corp., Bristol, Conn., strip steel, $123,725.
M. Baches' Sons, Wallingford, Conn., ammunition components, $49,700.
Bendix Aviation Corp., Brooklyn, N. Y., fire control equipment, $9375.
Bethlehem Steel Co., Bethlehem, Pa., steel rods, $146,362.58.
J. G. Blount Co., Everett, Mass., grinding machines, $6570.
Bohn Aluminum and Brass Corp., Detroit, artillery ammunition components, $117,685.
Bridgeport Thermostat Co., Bridgeport, Conn., ammunition components, $352,128.
Brown and Sharpe Mfg. Co., Providence, R. I., gages, $17,295.95.
Carpenter Steel Co., Reading, Pa., steel rods, $145,863.90.
Chase Brass & Copper Co., Waterbury, Conn., artillery ammunition components, $806,000.
Cincinnati Ball Crank Co., Cincinnati, ammunition components, $6258.20.
Cincinnati Milling Machine & Cincinnati Grinders Inc., Cincinnati, milling machines, $32,836.
Cleveland Welding Co., Cleveland, ammunition components, $449,820.
Colt's Patent Fire Arms Mfg. Co., Hartford, Conn., small arms components, $16,597.05.
Corbin Screw Corp., New Britain, Conn., ammunition components, $114,495.
Crucible Steel Co. of America, New York, strip steel, $53,702.
E. I. duPont de Nemours & Co. Inc., Barksdale, Wis., ammunition components, $305,500.
E. I. duPont de Nemours and Co., Pompton Lakes, N. J., ammunition components, $28,700.
Eastern Rolling Mill Co., Baltimore, artillery ammunition components, $1,883,000.
Electric Auto-Lite Co., Toledo, O., artillery ammunition components, $780,000.
Essex Specialty Co., Berkley Heights, N. J., ammunition components, $169,000.
William H. Field Co., Boston, machinery, $4153.
B. R. Gale Co., Boston, machinery, $5750.
General Motors Corp., Anderson, Ind., artillery ammunition components, $3,744,199.68.
General Motors Corp., Delco Products Division, Dayton, O., ammunition components, $853,649.40; Guide Lamp division, Anderson, Ind., ammunition components, $466,900.
Globe Machine & Stamping Co., Cleveland, ammunition components, $805,000.
Greenfield Tap and Die Corp., Greenfield, Mass., gages, $21,301.95.
Grigolet Co., Decatur, Ill., ammunition components, $23,372.70.
Guide Lamp division, Anderson, Ind., ammunition components, $466,900.
Hadley Special Tool Co. Inc., Boston, small arms materiel, $19,761.50.
Hanson-Whitney Machine Co., Hartford, Conn., gages, $28,432.05.
Heald Machine Co., Worcester, Mass., grinders, $4353.
W. F. Hebard & Co., Chicago, tractors, $3300.
Henry & Wright Mfg. Co., Hartford, Conn., machinery, $11,076.
Hevi Duty Electric Co., Milwaukee, electric furnaces, $7749.
Independent Lock Co., Fitchburg, Mass., artillery ammunition components, $965,000.
International Harvester Co., Chicago, ammunition components, $420,000.
Kilgore Mfg. Co., International Flare-Signal division, Tippecanoe City, O., ammunition components, $382,508.16.
Leeds & Northrup Co., Philadelphia, electric furnaces, $4952.
Link-Belt Co., Indiana division, Indianapolis, ammunition components, $155,000.
Minneapolis-Honeywell Regulator Co., Minneapolis, fire control equipment, $263,832.75.
Modern Tool and Die Co., Philadelphia, gages, $82,602.
Moline Forge Inc., Moline, Ill., ammunition components, $496,000.
National Automatic Tool Co., Richmond, Ind., drilling machines, $4560.
National Cash Register Co., Dayton, O., ammunition components, $542,229.90.
National Malleable and Steel Casting Co., Cleveland, ammunition components, $296,940.
National Pneumatic Co., Rahway, N. J., ammunition components, $406,000.
Niles - Bement - Pond Co., Philadelphia, gages, $9758.70.
Norris Stamping & Mfg. Co., Los Angeles, artillery ammunition components, $2,593,080.
Pennsylvania Forge Corp., Philadelphia, artillery ammunition components, $790,000.
Pipe Mfg. Co., Cleveland, gages, $1997.10.
Portland Forge and Foundry Co., Portland, Ind., ammunition components, $94,000.
Pratt & Whitney Division, Niles-Bement-Pond Co., Hartford, Conn., boring machines $17,506.
Henry Prentiss & Co. Inc., Cincinnati, lathes, $26,841.
Pressed Steel Car Co. Inc., Pittsburgh, artillery ammunition components, $1,230,000.
Pullman-Standard Car Mfg. Co., Butler, Pa., artillery ammunition components, $1,134,000.
Revere Copper and Brass Inc., Baltimore, Md., ammunition components, $34,774.84.
Russakov Can Co., Chicago, ammunition components, $129,000.
Scovill Mfg. Co., Waterbury, Conn., artillery ammunition components, $2,763,000.
Smith Corp., A. O., Milwaukee, artillery ammunition components, $3,561,500.
H. A. Smith Machinery Co., Syracuse, N. Y., milling machines, $50,696.
Sperry Gyroscope Co. Inc., Brooklyn, N. Y., fire control equipment, $54,600.
Standard Gage Co. Inc., Poughkeepsie, N. Y., gages, $3065.52.
Sterling Products Co., Moline, Ill., tapping machines, $1117.
Stewart-Warner Corp., Chicago, artillery ammunition components, $1,381,600.
Taft-Pierce Mfg. Co., Woonsocket, R. I., gages, $12,859.29.
Tredegar Co., Richmond, Va., ammunition components, $25,900.56.
Unexcelled Mfg. Co., New York, ammunition components, $1,183,736.
Universal-Cyclops Steel Corp., Bridgeville, Pa., steel rods, $145,115.88.
U. S. Machine Corp., Lebanon, Ind., ammunition components, $398,000.
Vandyck Churchill Co., New York, machines, $40,752.
Vinco Corp., Detroit, gages, $19,472.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., fire control equipment, $2140.80.
Wilson Brown Inc., New York, lathes, $10,137.
Winchester Repeating Arms Co., New Haven, Conn., ammunition components, $2650.
Carl Zeiss Inc., New York, fire control equipment, $3130.90.

Commission Clears Contracts

Supplementing war department awards listed above, it was reported last week the national defense advisory commission had cleared contracts totaling $29,615,906. The contracts were reported awarded by

the war department for the quartermaster corps and the ordnance department as follows:

Quartermaster Corps Awards

Dixon Co., L. E., Los Angeles, tent camp and utilities, Camp Merriam, San Luis Obispo, Calif., $3,880,341.

Morgan, J. E., El Paso, Tex., and H. B. Zachry, Laredo, Tex., tent camp and utilities, Ft. Bliss, El Paso, Tex., $3,046,230.

Walker Co., P. J., Los Angeles, tent camp and utilities, March field, California, $2,242,491.

Ordnance Department Awards

American Car & Foundry Co., Buffalo, ammunition components, $6,040,000.

Armstrong Cork Co., Lancaster, Pa., ammunition components, $822,000.

Babcock Printing Press Corp., New London, Conn., ammunition components, $607,500.

Case Co., J. I., Racine, Wis., ammunition components, $4,634,500.

General Railway Signal Co., Rochester, N. Y., ammunition components, $2,975,000.

National Supply Co., Ambridge, Pa., artillery ammunition components, $501,500.

National Tube Co., McKeesport, Pa., ammunition components, $3,365,000.

Woods Machine Co., S. A., Boston, ammunition components, $1,501,344.

Navy department announced the following yards and docks awards:

Armstrong Cork Co., Lancaster, Pa., refrigeration and cold storage rooms, marine barracks, Quantico, Va., $12,950.

M & L Construction Co. Inc., Philadelphia, temporary storehouses at naval aircraft factory, Philadelphia navy yard, and marine corps supplies depot, Philadelphia. Estimated cost, on a cost-plus-fixed-fee basis, $650,000.

Murray, F. P. and C. H., Cape Elizabeth, Me., miscellaneous repairs and improvements at naval direction finder station, Cape Elizabeth, $1775.62.

Tompkins Co., Charles H., Washington, instrument repair and storage building and accessories at naval observatory, Washington; naval research laboratory at Bellevue, District of Columbia; and barracks building and accessories at Bellevue. Contract awarded on a cost-plus-fixed-fee basis; estimated at $531,000.

Bureau of Supplies and Accounts Awards

American Brass Co., Waterbury, Conn., copper-nickel alloy tubing, $247,471.40.

American Steel & Wire Co. of N. J., Washington, electric cable, $40,397.90.

American Tool Works, Cincinnati, engine lathes, $51,010.

Anaconda Wire & Cable Co., New York, electric cable, $251,349.96.

Auto Sales & Service Co., Washington, motor trucks, $176,890.

Baldt Anchor, Chain & Forge Corp., Chester, Pa., anchor chain, $53,877.

Barrett Co., New York, synthetic sodium nitrate, $29,400.

Birchfield Boiler Inc., Tacoma, Wash., covered lighter, $65,650.

Carnegie-Illinois Steel Corp., Pittsburgh, steel, $4,826,464.55.

C-O-Two Fire Equipment Co., Newark, N. J., fire and rescue trucks, $115,092.12.

Chicago Pneumatic Tool Co., New York, pneumatic drills, $10,143.60.

Cincinnati Milling Machine & Cincinnati Grinders, Inc., Cincinnati, grinding and milling machines, $65,252.80.

Collyer Insulated Wire Co., Pawtucket, R. I., electric cable, $68,920.25.

Electric Heater Co., Bridgeport, Conn., steel barrels, $156,232.34.

Electric Products Co., Cleveland, welding panels, $18,880.

General Cable Corp., New York, electric cable, $40,699.90.

General Electric Co., Schenectady, N. Y., electric cable, welding sets, $218,532.50.

(*Please turn to Page* 93)

Purchases Under Walsh-Healey Act

(In week ended Sept. 28)

Iron and Steel Products	Commodity	Amount
Air Reduction Sales Co., New York	Steel fittings	$25,095.68
Albert Pipe Supply Co. Inc., Brooklyn, N. Y.	Torches	20,340.43
Allegheny Ludlum Steel Corp., Watervliet, N. Y.	Steel rods	34,210.80
American Brake Shoe & Foundry Co., Chicago	Forgings	244,110.00
American Brass Co., Waterbury, Conn.	Spur grommets	26,892.84
American Locomotive Co., Schenectady, N. Y.	Forgings	51,895.00
Artistic Iron Products Co., Cleveland	Windows, louvers	27,910.00
Bethlehem Steel Co., Bethlehem, Pa.	Steel rods, forgings	*49,197.78
Bethlehem Steel Co., Los Angeles	Steel bars	15,480.00
Bliss & Laughlin Inc., Buffalo	Steel rods	33,220.85
Buhl Stamping Co., Detroit	Milk cans	53,600.00
Carpenter Steel Co., Reading, Pa.	Steel rods	*34,265.63
Columbia Steel Co., Los Angeles	Steel bars	14,475.00
Continental Can Co. Inc., New York	Canister parts	29,301.89
Crane Co., Norfolk, Va.	Steel valves	11,493.00
Crown Cork & Seal Co. Inc., Philadelphia	Chemical containers	71,354.60
Crucible Steel Co. of America, New York	Tool steel, rods	*79,508.13
Flagg, Stanley G., & Co. Inc., Philadelphia	Pipe flanges	39,938.46
Froiland Mfg. Co., Springfield, Mass.	Antenna	83,075.00
Harvey Metal Corp., Chicago	Forgings	145,800.00
Hershey Metal Products Inc., Derby, Conn.	Steel cores	45,600.00
Hoe, R., & Co. Inc., New York	Recoil mechanisms	732,000.00
Jahn, B., Mfg. Co., New Britain, Conn.	Forming dies	17,310.00
Judd Co., H. L., New York	Bolts, nuts	29,000.00
Kennedy-Van Saun Mfg. & Eng'r'g Corp., Danville, Pa.	Mortars	638,269.47
Kidde, Walter, & Co. Inc., New York	Steel cylinders	31,334.31
Kline Iron & Metal Co., Columbia, S. C.	Structural steel	22,500.00
Macomber Inc., Canton, O.	Auto, rifle parts	27,902.61
McCulloch Mfg. Co., South Boston, Mass.	Landing mat panels	22,934.34
Midvale Co., Philadelphia	Barrels	1,260,308.00
Minneapolis Honeywell Regulator Co., Minneapolis	Stand assemblies	45,742.32
National Tube Co., Pittsburgh	Steel flasks	177,230.06
Noland Co., Washington	Lavoratories	19,884.00
Pullman-Standard Car Mfg. Co., New York	Mortars	838,150.00
Rabinowe, E., & Co. Inc., Yonkers, N. Y.	Wire nails	14,920.00
Reliance Steel Products Co., McKeesport, Pa.	Landing mat panels	31,986.90
Sargent & Co., New Haven, Conn.	Bolts, hooks	16,800.97
Seattle Plumbing Supply Co., Seattle	Plumbing supplies	20,179.49
Sieg Co., Davenport, Iowa	Jacks	12,180.60
Standard Machinery Co., Providence, R. I.	Gun mounts	13,534.00
Tri State Pipe Co., Bellaire, O.	Used pipe	25,345.00
United States Steel Export Co., New York	Spillway gates	67,101.00
Veit & Young, Philadelphia	Punches, dies	13,110.00
Wackman Welded Ware Co., St. Louis	Tent stoves	39,600.00
Wittek Mfg. Co., Chicago	Clamp, hose	16,768.53

*Estimated.

Nonferrous Metals and Alloys		
Aluminum Cooking Utensil Co., New Kensington, Pa.	Aluminum ware	$10,901.00
Philadelphia Bronze & Brass Corp., Philadelphia	Bronze castings	12,275.32
Scovill Mfg. Co., Waterbury, Conn.	Containers	25,821.25

Machinery and Other Equipment		
Acme Machinery Co., Cleveland	Forging machine	$27,384.00
American Hoist & Derrick Co., St. Paul	Crane	32,207.00
American Tool Works Co., Cincinnati	Drilling machines	15,570.00
American Tube Bending Co., New Haven, Conn.	Engine parts	23,171.25
Axelson Mfg. Co., Los Angeles	Engine lathes	61,459.20
Bay City Shovels Inc., Bay City, Mich.	Power shovels	17,100.00
Bethlehem Steel Co., Quincy, Mass.	Turbine parts	48,558.79
Billings & Spencer Co., Hartford, Conn.	Trimming presses	15,675.00
Blakeslee, G. S., & Co., Cicero, Ill.	Washing machines	12,626.00
Bliss Co., E. W., New York	Presses	66,383.00
Brown & Sharpe Mfg. Co., Providence, R. I.	Milling machines	40,819.50
Buffalo Pumps Inc., Buffalo	Pumps	36,540.00
Bullard Co., Bridgeport, Conn.	Lathes	87,056.81
Caterpillar Tractor Co., Peoria, Ill.	Tractors	19,072.54
Chambersburg Engineering Co., Chambersburg, Pa.	Drop hammers	53,525.00
Chicago Flexible Shaft Co., Chicago	Clipping machines	15,202.99
Cincinnati Milling Machines & Cincinnati Grinders Inc., Cincinnati	Machine tools	189,670.70
Continental Motors Corp., Muskegon, Mich.	Engine parts	69,082.94
Ex-Cell-O Corp., Detroit	Broaches	10,935.00
Hannifin Mfg. Co., Chicago	Recoil mechanism	244,061.35
Hires, Castner & Harris Inc., Philadelphia	Primer manufacturing equipment	15,385.00
Kearney & Trecker Corp., Milwaukee	Milling machines	59,763.85
Kingsbury Machine Tool Corp., Keene, N. H.	Drilling machine	15,841.00
Krueger, H. R., & Co., Detroit	Machine tools	82,635.00
Lloyd & Arms Inc., Philadelphia	Lathes	10,509.00
Lodge & Shipley Machine Tool Co., Cincinnati	Engine lathes	119,756.00
Niles-Bement-Pond Co., Pratt & Whitney division, West Hartford, Conn.	Borer, rifling, chambering machines	168,837.00
Onsrud Machine Works Inc., Chicago	Machinery	12,142.00
Otis Elevator Co., New York	Elevators	36,530.00
Prentiss, Henry, & Co. Inc., New York	Machine tools	187,536.00
Stokes, F. J., Machine Co., Philadelphia	Dryers	10,920.00
Underwood Machinery Co., South Boston, Mass.	Power rammer	11,255.00
Warner & Swasey Co., Cleveland	Turret lathes	32,475.00
Wilson-Weesner-Wilkinson Co., Knoxville, Tenn.	Gantry cranes	171,225.00
GRAND TOTAL		$7,340,765.18

Army, Navy Awards

(*Concluded from Page* 92)

General Electric X-Ray Corp., Chicago, X-Ray dental units, $21,352.50.
General Motors Corp., Chevrolet division, Detroit, motor trucks, $6255.15.
Gould & Eberhardt, Newark, N. J., gear hobbing machine, $6675.
Grabler Mfg. Co., Cleveland, pipe fittings, $41,755.90.
International Harvester Co. Inc., Chicago, motor trucks, $46,584.
Jones & Laughlin Steel Corp., Pittsburgh, bar steel, $86,281.80.
Kearney & Trecker Corp., Milwaukee, milling machines, $37,764.95.
Keystone Bolt & Nut Corp., New York, machine bolts, $6413.09.
Leblond, R. K., Machine Tool Co., Cincinnati, engine lathes, $105,759.
Landis Tool Co., Waynesboro, Pa., universal grinders, $5472.
Samuel Levine, New York, iron unions, $15,698.19.
Lidgerwood Mfg. Co., Elizabeth, N. J., winches, $31,260.
Lodge & Shipley Machine Tool Co., Cincinnati, engine lathes, $77,136.
Lucas Machine Tool Co., Cleveland, horizontal, boring, milling and drilling machine $9540.
Lukens Steel Co., Coatesville, Pa., steel, $889,024.85.
Monarch Machine Tool Co., Sidney, O., precision lathe, $8832.
National Electric Products Corp., Pittsburgh, electric cable, $222,857.83.
National Engineering Co., Chicago, sand mixing machine, $14,701.
Niles-Bement-Pond Co., West Hartford, Conn., precision lathes, $11,003.
Northern Pump Co., Minneapolis, hydraulic drive gear for towing carriage, $32,975.
Norton Co., Worcester, Mass., universal tool and cutter grinders, $6921.60.
Okonite Co., Passaic, N. J., electric cable, $100,549.90.
Oliver Iron & Steel Corp., Pittsburgh, bolts and nuts, $49,218.13.
Pacific Car & Foundry Co., Seattle, railroad cars, $14,245.
Phelps Dodge Copper Products Corp., New York, copper-nickel alloy tubing, electric cable, $216,867.51.
Republic Steel Corp., Cleveland, bolts and nuts, $31,607.33.
Rockbestos Products Corp., New Haven, Conn., electric cable, $40,408.90.
Rockford Machine Tool Co., Rockford, Ill., openside planer, $18,774.
milling machines $65,252.80.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y., steel nuts, $19,-813.93.
Scovill Mfg. Co., Waterbury, Conn., copper-nickel alloy tubing, $33,568.48.
Smith-Courtney Co., Richmond, Va., universal grinders, $19,167.
Stedfast & Roulston Inc., Boston, boring mill, $31,706.40.
Sterling Electric Motors Inc., Los Angeles, geared-head type motors, $5506.45.
Swind Machinery Co., Philadelphia, horizontal boring, drilling and milling machine, $29,891.
Union Insulating Co., Parkersburg, W. Va., incandescent lamp sockets, plug tips, $15,568.
United States Gauge Co., New York, air speed indicators, $42,600.
Vandyck Churchill Co., Philadelphia, boring mill, $31,655.50.
Walworth Co., New York, pipe fittings, $37,600.50.
Warner & Swasey Co., Cleveland, turret lathes, $25,446.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., welding sets, $40,000.
Worth Steel Co., Claymont, Del., steel, $1,343,095.52.
Yellow Truck & Coach Mfg. Co., Pontiac, Mich., motor trucks, $82,056.75.
Youngstown Sheet & Tube Co., Youngstown, O., nickel steel, $27,496.

Steel Constructors Ask For Accurate Drawings

■ A plea to purchasers of fabricated structural steel to have their design drawings complete and correct at the time of placing contracts, in the interests of an efficient defense program, is issued by the American Institute of Steel Construction, Inc., New York.

"It seems advisable," says the institute's statement, "to point out the desirability for better co-operation of architects, engineers and buyers with the fabricators in coordinating the entire process for preparing plans and specifications and placing contracts for the fabricating and erection work.

"Fabricated structural steel is not a product that can be manufactured in advance and carried in stock, but must be rolled and fabricated to order to fit the definite and precise requirements for a particular project in strict accord with previously prepared plans.

"The delivery of the finished product is governed not by the date upon which the contract is awarded, but rather by the date on which the fabricator receives the completed plans from which he can order his material and prepare his shop details."

Factory Building Costs Advanced 8.9 Per Cent

■ Factory building costs advanced 8.9 per cent during the third quarter, according to the quarterly index compiled by the Austin Co., Cleveland, engineers and builders. This index records the average cost of typical one-story steel frame monitor type plants.

Present costs are still below the levels prevailing in the '20s and during the recovery peak of 1937. Recent advances in the cost of lumber, fabricated steel and general building expense account for the largest proportion of this increase.

Republic Expands Drawn Steel Division

■ Republic Steel Corp., Cleveland, last week reported plans for expansion of its Union Drawn Steel division at Gary, Ind. Contract for expanding the finishing and producing building, additions to the rough stock buildings and rehabilitation of an existing structure for installation of new annealing furnaces has been let.

The new buildings, to be equipped for handling rough and finished materials, will be 85 x 300 feet and 150 x 150 feet.

U. S. Steel Officials To Visit Cleveland

■ Several hundred Cleveland business men and civic leaders have been invited by B. F. Fairless, president, United States Steel Corp., to meet the corporation's chairman, Irving S. Olds, at a dinner at the Statler hotel, Oct. 17. Several of the corporation's directors will be in the party, which also will inspect the corporation's operations in Lorain and Cleveland.

Provides Constant "Indoor Weather"

■ **All-Steel Equip Co. recently moved into this "controlled conditions" general office building in Aurora, Ill. Designed and built by the Austin Co., Cleveland, the building is windowless, air-conditioned and fluorescent-lighted, and typifies the latest trend in industrial building**

EDITORIAL

"Each Will Sacrifice for the Other"

■ NO OPEN-MINDED patriotic American can do other than embrace with hearty approval Wendell Willkie's labor program as outlined by him in his speech at Pittsburgh on Oct. 4.

* * *

It seems to this writer that the portion of it which should be read with especial thoughtfulness by industrial management in general is the concluding paragraph in which the Republican candidate declared:

"I propose a triumvirate of labor, agriculture and business—one for all and all for one. That triumvirate will work together. Each will see the others' problems. Each will sacrifice for the other. Each will work toward the others' gain. And then, I know that there is nothing that can stop this wonderful America, this great dynamic giant. Nothing can stop us from bursting through our present doubt and discouragment into a world of new hope and new horizons."

* * *

In his youth, this writer worked for a number of years as an iron molder and machinist. He distinctly recalls that employers in those days were willing to "sacrifice" for the worker's gain in much smaller measure than desired by the employes. It was rather customary to adjust wages downward when the labor market permitted. Worst of all—and this happened to the writer on a number of occasions—it was not unusual to reduce piece-work rates when a man, by increasing his output, was earning more money than the management was willing to put in his pay envelope. Naturally, such policies were never very well received by the men.

Despite the liberality of most present-day employers toward their workers, some of them still fail to realize the seriousness of such tactics. Commenting on slowdowns instigated by organized labor, A. H. Allen, STEEL's Detroit editor, makes it clear (STEEL of Oct. 7, p. 27) that in certain cases at least, unfair reductions in piece-work rates still do occur.

* * *

He illustrates the point by describing how one partsmaker, on the other hand, has pushed up production and lowered cost by successfully selling his workers, all union members, on a scientifically based piece-work system which rewards workers for increased productivity, by increased compensation. Here is a "speed-up" in a unionized plant in direct contrast to the well-known present-day union preference for "slowdowns"! It shows that, union or no union, the men are open to an appeal to reason when it is also coupled with assurance of fair treatment.

* * *

"Each will sacrifice for the other!" And why not? The idea may seem idealistic and impracticable to some but actually it represents sound sense. The fact is that a great many employers have been following this very philosophy for many years past and in the long run it has paid. It is a philosophy which, if universally applied, would do more to solve labor problems than anything else.

E C Kreutzberg

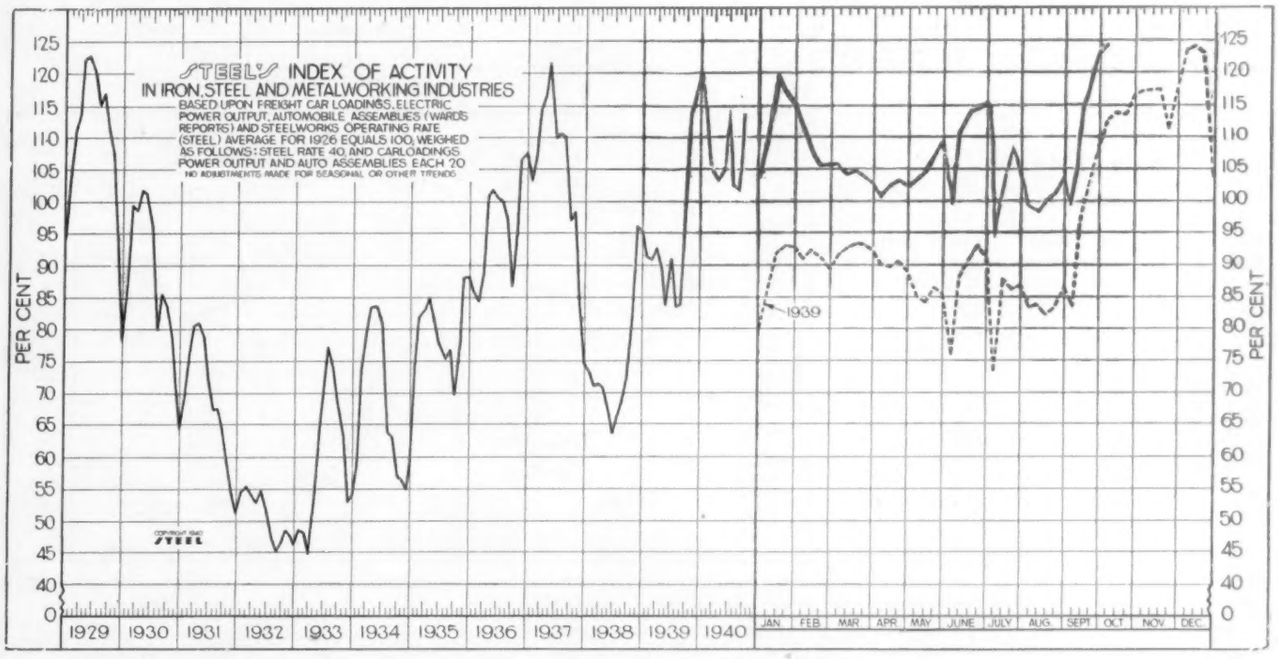
The *BUSINESS TREND*

Defense Needs Brighten Industrial Outlook

■ THE upward trend of industrial activity continues unabated, stimulated by expanding export trade and broadening demand resulting from the rearmament program. Near capacity operations are maintained in the heavy industries, notably steel, machine tools, heavy electrical equipment, shipbuilding, and construction fields. In most of these industries large plant expansion programs are now underway, which would indicate still greater volume of production attainable in the near future.

During September, STEEL's weekly index averaged 113.5, a gain of 12.4 points over the previous month's index figure and compares with the September, 1939 average of 98.

Reflecting a sharp upturn in automobile production and moderate gain in steelmaking operations during the week ended Oct. 5, STEEL's index gained 1.6 points to 124.4. Excluding the Memorial Day week, the latest advance recorded by the index represents the seventh consecutive weekly increase. The index is now above the 1939 peak of 124.2 but remains under the 125.3 level recorded during 1929.


STEEL'S INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARDS REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100, WEIGHED AS FOLLOWS: STEEL RATE 40, AND CARLOADINGS, POWER OUTPUT AND AUTO ASSEMBLIES EACH 20
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
1939
1929 1930 1931 1932 1933 1934 1935 1936 1937 1938 1939 1940
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity gained 1.6 *points to* 124.4 *in the week ended Oct.* 5:

Week Ended	1940	1939
July 27	103.4	86.8
Aug. 3	99.7	83.5
Aug. 10	98.5	83.9
Aug. 17	100.8	82.2
Aug. 24	101.4	83.4
Aug. 31	103.5	86.3
Sept. 7	98.7	83.7
Sept. 14	114.9	97.5
Sept. 21	117.7†	103.0
Sept. 28	122.8†	107.9
Oct. 5	124.4	112.5

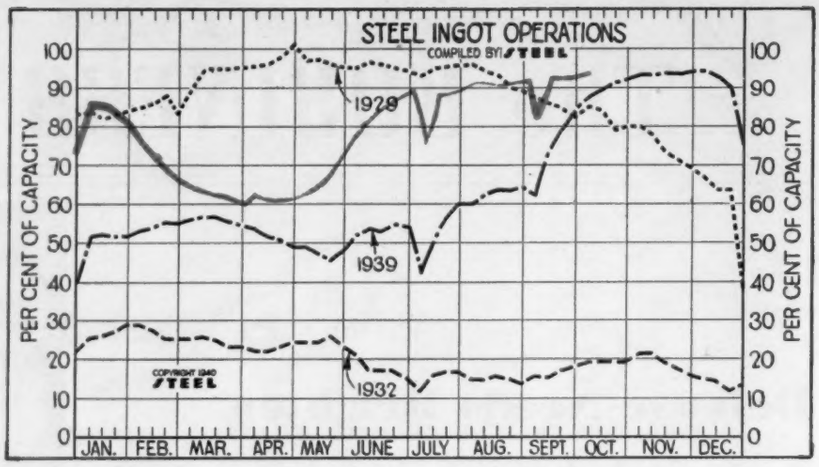
†Revised.

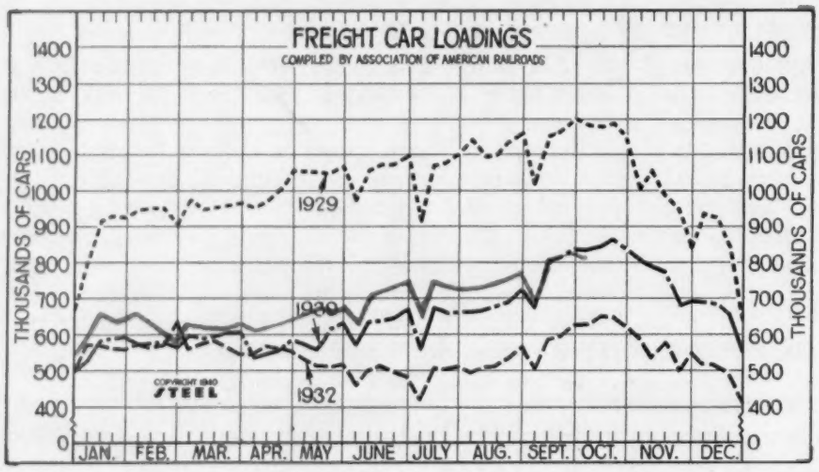
Mo. Data	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931	1930	1929
Jan.	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1	87.6	104.1
Feb.	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5	99.2	111.2
March	104.1	92.6	71.2	114.4	88.7	83.1	78.9	44.5	54.2	80.4	98.6	114.0
April	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0	101.7	122.5
May	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6	101.2	122.9
June	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1	95.8	120.3
July	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3	79.9	115.2
Aug.	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4	85.4	116.9
Sept.	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3	83.7	110.8
Oct.	....	114.0	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2	78.8	107.1
Nov.	.....	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4	71.0	92.2
Dec.	.....	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3	64.3	78.3

Steel Ingot Operations

(Per Cent)

Week ended	1940	1939	1938	1937
July 6....	75.0	42.0	24.0	74.0
July 13....	88.0	50.5	32.0	82.0
July 20....	88.0	56.5	36.0	81.0
July 27....	89.5	60.0	37.0	84.0
Aug. 3....	90.5	60.0	40.0	84.5
Aug. 10....	90.5	62.0	40.0	84.0
Aug. 17....	90.0	63.5	41.5	81.0
Aug. 24....	90.5	63.5	43.5	83.0
Aug. 31....	91.5	64.0	44.5	83.0
Sept. 7....	82.0	62.0	41.5	72.0
Sept. 14....	93.0	74.0	46.0	80.0
Sept. 21....	93.0	79.5	48.0	76.0
Sept. 28....	93.0	84.0	47.0	74.0
Oct. 5....	93.5	87.5	48.5	66.0





Freight Car Loadings

(1000 Cars)

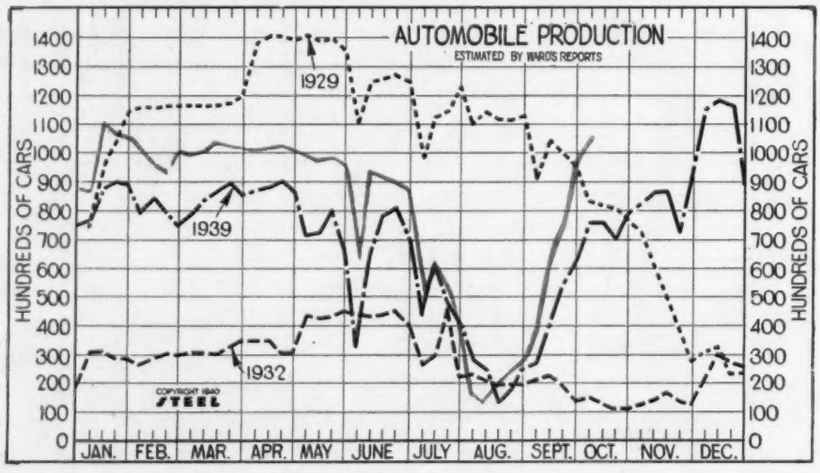
Week ended	1940	1939	1938	1937
July 6.....	637	559	501	682
July 13.....	740	674	602	770
July 20.....	730	656	581	771
July 27.....	718	660	589	783
Aug. 3.....	718	661	584	770
Aug. 10.....	727	665	590	777
Aug. 17.....	743	674	598	781
Aug. 24.....	761	688	621	787
Aug. 31.....	769	722	648	805
Sept. 7.....	695	667	569	711
Sept. 14.....	804	806	660	827
Sept. 21.....	813	815	676	840
Sept. 28.....	822†	835	698	847
Oct. 5.....	806	835	703	815

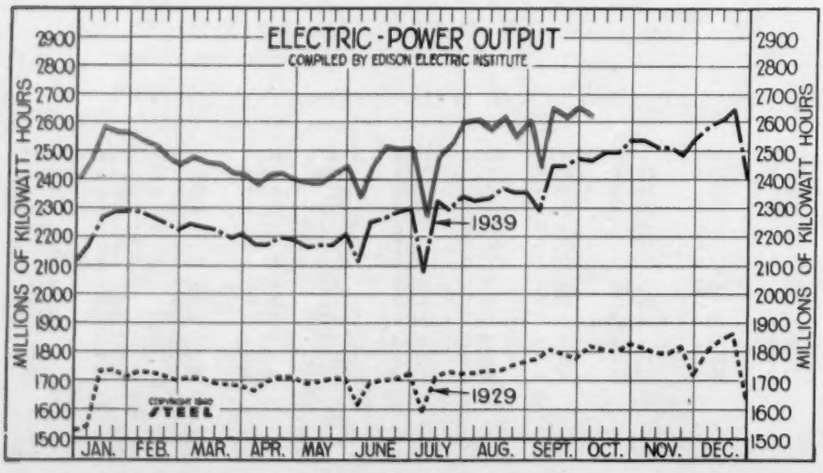
†Revised.

Auto Production

(1000 Units)

Week ended	1940	1939	1938	1937
July 6....	52.0	42.8	25.4	101.0
July 13....	62.2	61.6	42.0	115.4
July 20....	53.0	47.4	32.1	88.1
July 27....	34.8	40.6	30.4	86.4
Aug. 3....	17.4	28.3	14.8	78.7
Aug. 10....	12.6	24.9	13.8	103.3
Aug. 17....	20.5	13.0	23.9	93.3
Aug. 24....	23.7	17.5	18.7	83.3
Aug. 31....	27.6	25.2	22.2	64.2
Sept. 7....	39.7	26.9	17.5	59.0
Sept. 14....	66.6	41.2	16.1	30.1
Sept. 21....	78.8	53.9	20.4	28.0
Sept. 28....	95.9	62.8	25.4	45.8
Oct. 5....	105.2	76.1	37.7	72.0




ELECTRIC-POWER OUTPUT
COMPILED BY EDISON ELECTRIC INSTITUTE
MILLIONS OF KILOWATT HOURS
1939
1929
COPYRIGHT 1940 STEEL
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

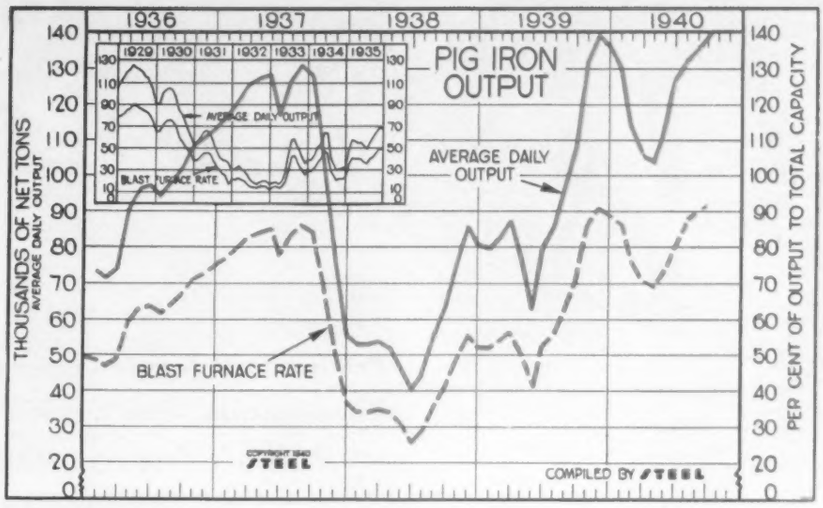
Electric Power Output

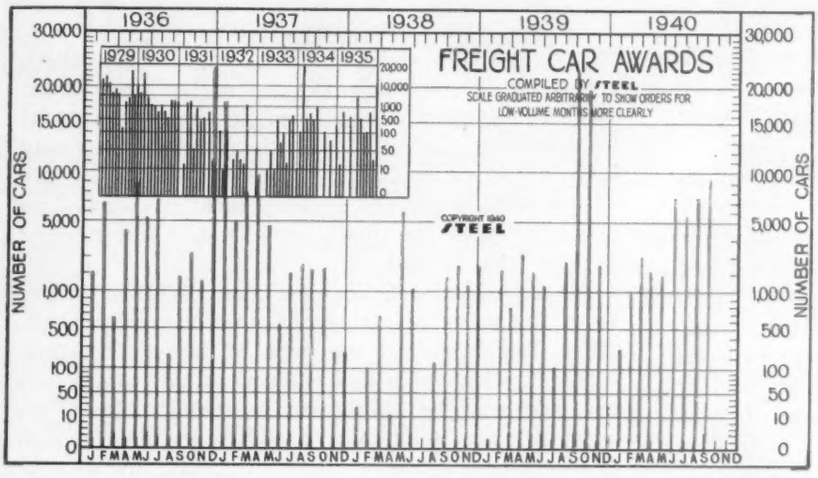
(Million KWH)

Week ended	1940	1939	1938	1937
July 6...	2,265	2,088	1,881	2,096
July 13...	2,483	2,324	2,084	2,298
July 20...	2,524	2,295	2,085	2,259
July 27...	2,601	2,342	2,094	2,256
Aug. 3...	2,605	2,325	2,116	2,262
Aug. 10...	2,589	2,333	2,134	2,301
Aug. 17...	2,606	2,368	2,139	2,304
Aug. 24...	2,571	2,354	2,134	2,295
Aug. 31...	2,601	2,357	2,149	2,321
Sept. 7...	2,463	2,290	2,048	2,154
Sept. 14...	2,639	2,444	2,215	2,281
Sept. 21...	2,629	2,449	2,154	2,266
Sept. 28...	2,670	2,470	2,139	2,275
Oct. 5...	2,641	2,465	2,154	2,280

Pig Iron Production

	Daily average Net Tons			Blast furnace Rate (%)		
	1940	1939	1938	1940	1939	1938
Jan.	129,825	78,596	52,201	85.4	51.0	33.6
Feb.	113,943	82,407	52,254	75.0	53.5	33.6
Mar.	105,502	86,465	53,117	69.5	56.1	34.2
Apr.	104,635	76,732	51,819	68.9	49.8	33.4
May	112,811	62,052	45,556	74.2	40.2	29.4
June	127,103	79,125	39,601	83.6	51.4	25.5
July	130,984	85,121	43,827	86.1	55.0	28.2
Aug.	136,599	96,122	54,031	89.9	62.4	34.8
Sept.	139,085	107,298	62,835	91.5	69.7	40.5
Oct.	.....	131,053	74,697	....	85.2	48.0
Nov.	.....	138,883	85,369	....	90.3	55.0
Dec.	.....	136,119	79,943	....	88.5	51.4
Av.	.....	86,375	51,752	....	62.6	37.3


PIG IRON OUTPUT
AVERAGE DAILY OUTPUT
BLAST FURNACE RATE
THOUSANDS OF NET TONS AVERAGE DAILY OUTPUT
PER CENT OF OUTPUT TO TOTAL CAPACITY
COMPILED BY STEEL



Freight Car Awards

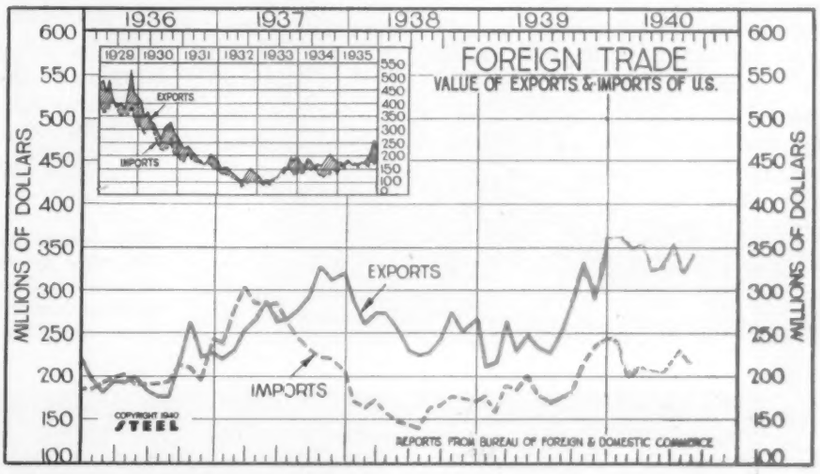
(Hundreds of Cars)

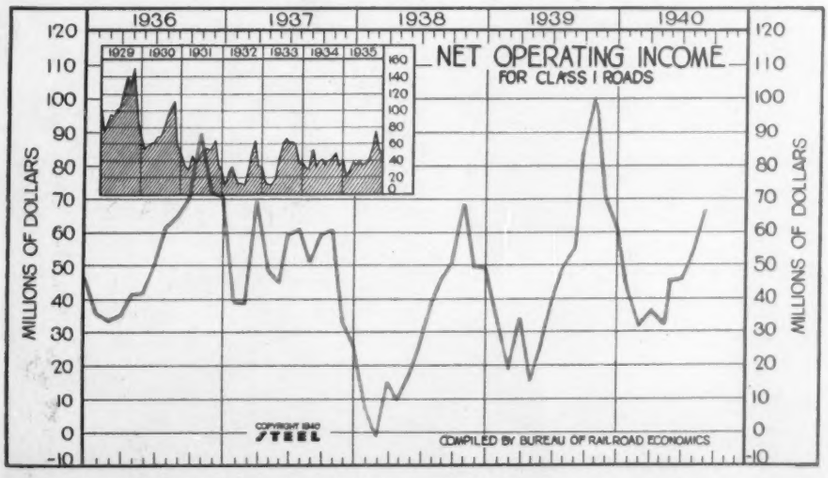
	1940	1939	1938	1937
Jan.	3.60	.03	.25	178.06
Feb.	11.47	22.59	1.09	49.72
Mar.	31.04	8.00	6.80	81.55
April	20.77	30.95	.15	97.72
May	20.10	20.51	60.14	47.32
June	74.75	13.24	11.78	5.48
July	58.46	1.10	.00	10.30
Aug.	75.25	28.14	1.82	14.75
Sept.	97.35	230.00	17.50	12.16
Oct.	.....	196.34	25.37	13.55
Nov.	.....	26.50	12.32	2.75
Dec.	.....	.35	25.81	2.75
Total	.....	577.75	163.03	516.11

United States Foreign Trade

(Unit: $1,000,000)

	Exports 1940	Exports 1939	Imports 1940	Imports 1939
Jan.	$368.6	$212.9	$241.9	$178.2
Feb.	347.0	218.6	199.8	158.0
Mar.	352.3	267.8	216.7	190.5
April	324.0	231.0	212.2	186.3
May	325.3	249.5	211.4	202.5
June	350.2	236.1	211.4	178.9
July	317.0	229.6	232.3	168.9
Aug.	349.8	250.8	220.2	175 8
Sept.	.....	288.6	.....	181.5
Oct.	.....	332.1	.....	215.3
Nov.	.....	292.7	.....	235.4
Dec.	.....	367.8	.....	247.0
Total	.....	$3,177.0	.....	$2,318.3





Class I Railroads Net Operating Income

(Unit: $1,000,000)

	1940	1939	1938	1937
Jan.	$45.57	$32.89	$7.14	$38.87
Feb.	32.62	18.59	1.91*	38.78
Mar.	36.73	34.32	14.73	69.88
April	33.82	15.32	9.40	48.36
May	47.08	25.10	16.67	44.24
June	47.42	39.10	25.16	59.35
July	57.08	49.01	38.43	60.99
Aug.	66.01	54.59	45.42	50.76
Sept.	.....	86.43	50.36	59.62
Oct.	.....	101.62	68.57	60.86
Nov.	.....	70.35	49.67	32.44
Dec.	.....	60.95	49.37	25.99
Average	.....	$49.02	$31.02	$49.18

*Indicates deficit.

Paint For Greater Efficiency

By JAMES A. MEACHAM
Sherwin-Williams Co.
Cleveland

Production demands emphasize use of paint to raise illumination levels. Making seeing tasks easier ups output . . . Proper paint increased heat radiation from radiators as much as 17 per cent

■ ONE COAT of white paint on the girders, walls and ceiling of a Massachusetts foundry recently boosted the amount of light at floor level by 125 per cent.

A metal parts fabricator increased lighting intensity on machines from 6 to 17 foot-candles by covering dingy upper surfaces with a new mill-white.

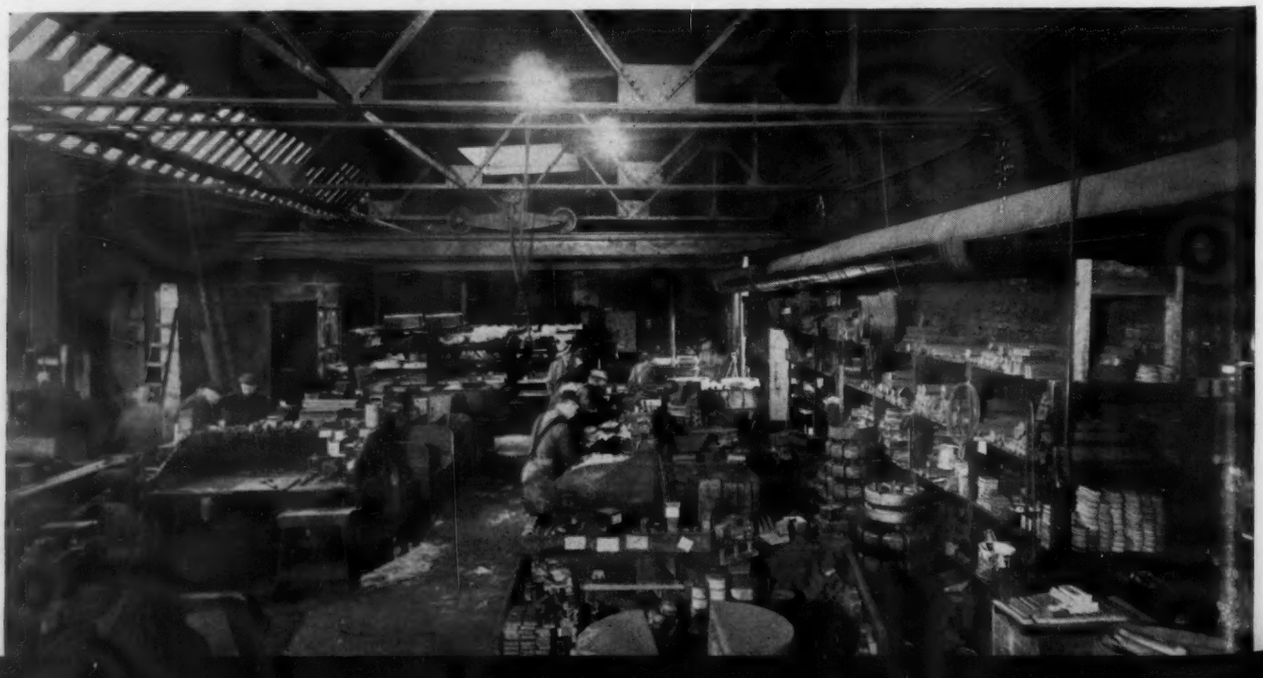
An Ohio manufacturer of heating equipment found to his amazement that one coat of a special high-reflecting paint transformed his dingy, spottily-lighted plant to a bright, clean and enjoyable place to work —boosted floor level light over 100 per cent and in one bay raised the amount of light from 5 foot-candles to 15.

Such cases dramatize three known-but-often-forgotten reasons why metal-working plants should watch their walls and ceilings as carefully as they watch their lubrication or power supply. Obvious, properly painted plants save on lighting bills. One eastern factory estimates a 40 per cent saving on current consumption. Obvious, too, is the fact that higher and more even light levels increase each worker's efficiency, for repeated tests have borne this out. The third reason, most often overlooked, is the employe relations aspect of paint—the better frame of mind and the cheery outlook of the workers in a brightly painted and therefore clean looking plant.

Another by-product advantage of having a paint-minded maintenance department is its effect on plant housekeeping. Posters, admonitions and lectures may leave employes cold unless someone leads the way with a paint brush. Once management has slicked up and brightened the plant, workers feel honor-bound to help keep it that way.

All use of paint to improve plant lighting springs from the reflection values of wall and ceiling surfaces. Regardless of the type of factory building, high-reflection walls and ceiling will distribute natural and artificial light better, reduce excessive contrast between light sources and backgrounds which is very tiring to the workers' eyes. Lighting experts call walls and ceilings "secondary light sources" and optical tests have shown that minimum eye strain occurs when the amount of light reflected from those sources is approximately the same as that reflected by the material on which a man is working. This is but one of the factors that makes the use of a light

What proper paint will do is demonstrated by the before and after views in same shop—lower left and right, respectively. Although adequate light sources were present, working conditions before were not to be compared with those after painting. Illumination level was greatly increased also



meter, reading in foot-candles, an important piece of equipment in working out any painting plan.

The ability of dirty walls to absorb light can be gaged from the fact that black walls reflect only 2 per cent of the light from windows or electric bulbs, gray walls reflect about 46 per cent of the light, while modern mill whites reflect more than 85 per cent—actually more than many silvered mirrors. One test showed that with unpainted brick walls the light meter read 1 foot-candle, with dirty walls 4 foot candles, and with white walls the meter jumped to 22½ foot-candles—all with the same artificial lighting source.

To determine just how deficient a given plant is in light intensity levels, the data in Table I can be compared with existing light intensities.

This table shows the trend in plant lighting today is strongly in the direction of a high general illumination, with extra light sources spotted close to fine-work areas. High general illumination calls for indirect or semi-indirect light fixtures which throw the bulk of their light towards the ceiling to have it reflected back and distributed evenly throughout the room. Even in rooms where ceilings were formerly considered too high for effective reflection, this technique is now being used successfully. However, it requires the use of high-reflection whites which will

Three illustrations at upper right show how color and finish of walls influence both quantity and quality of light in a room. Light source was same in all three. Top shows walls painted with mill white in an eggshell finish. Reflectivity rating is 87 per cent. Diffusion is so nearly complete that there is no observable contrast between light source and wall

Center, walls finished with a high-grade polished aluminum bronze show high specular reflective power as indicated by sharpness of image of both light source and reflected table top on the walls—also light carried across floor. Reflection value is 60 per cent. Light has spotty, glaring quality. Foot-candle readings show less light because more is being absorbed than by the white surface, above

In the black room, a spotlight effect is achieved. Black and dirty walls diffuse practically no light, so approach condition illustrated here, giving pronounced glare, increasing current required to produce necessary illumination

stay white despite dust and fumes, In recent years, paint chemists have succeeded in providing such finishes.

The use of new synthetic vehicles instead of oil reduces the yellowing and graying tendency which formerly occurred when paints aged. Thus high light reflection now can be maintained for four or five years. Furthermore new pigments provide both higher initial whiteness and lasting whiteness. These recent improvements now eliminate the old arguments against white painting which were based on the short period which white paints remained truly white.

Other qualities of mill finishes have recently been improved. The new paints have a far greater opacity, which means that frequently a one-coat job is sufficient, even on dark walls. They dry much faster, which means that no shutdown is necessary. They have greater dirt-resistance and washability and so stay white despite wear and dirt conditions. They also are made in special chemical-fume-resistant formulations to permit their use under conditions that formerly blackened paint in a few months.

In the scale of light-reflection values of white paints, the flat-type white naturally comes first, because of its so-called "diffused" reflection, which means that light rays are scattered in all directions. High gloss factory finishes reflect light rays in parallel lines and while the total amount reflected is almost as high, the soft diffused effect is not so apparent. In between the flat and the gloss are finishes with intermediate degrees of gloss, usually called semi-gloss and eggshell.

While gloss finishes are most resistant to washing and wear, great strides have been made in giving the flat and eggshell finishes high resistance to abrasion. Today's synthetic eggshell whites are as tough and resistant as gloss finishes were a decade or two ago, and most metal-working plants can use this semi-flat finish throughout without fear of discoloring from normal dirt and abrasion.

In addition to the all-important factor of proper light-reflection, paint can also be used in many ways to make a plant cheerier. Color can be applied to dados, machines and other equipment to relieve monotony and increase efficiency. Contrasting colors can be applied to operating levers to permit faster operation and greater safety. Red applied to danger zones always promotes safer habits.

Cool colors, such as blue or green can be used on lower portions of excessively warm rooms, and conversely, warm colors such as red, orange or buff can be used where work must be done under conditions of excessive cold. Pipelines can be painted with colored enamels for identification without seriously affecting ceiling light reflection. Radiators can be brightened with light colored enamels, which will improve their heat radiation as much as 17 per cent.

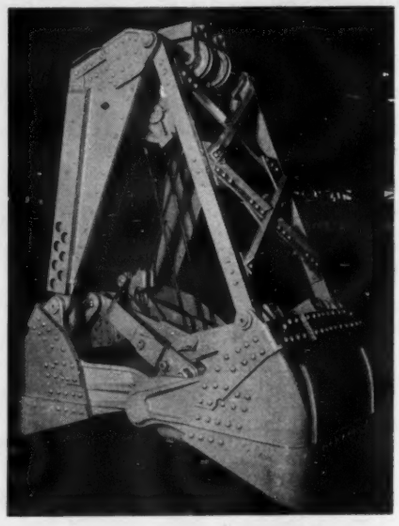
Thus, all in all, the man with the paint brush can be as important a figure as the motion study man in the constant fight for greater productivity.

TABLE I—Intensity Recommendations

Operation	Foot-Candles
Assembling:	
Rough	5– 10*
Medium	15– 20
Fine	25–100
Extra Fine	50–100+
Foundries:	
Charging Floor, Tumbling, Pouring and Shaking Out	5
Rough Molding and Core Work	8–10
Fine Molding and Core Making	15– 20
Inspecting:	
Rough	5– 10
Medium	10– 20
Fine	25–100
Extra Fine	50–100+
Machine Shops:	
Rough Bench and Machine Work	8– 10
Medium Class Work, Rough Grinding, etc.	15– 20
Fine Bench and Machine Work	25–100
Extra Fine Work	50–100+
Paint Shops:	
Dipping, Spraying, Firing	10
Rubbing, Hand Finishing (ordinary)	20
Fine Hand Painting	25–100
Extra Fine Hand Finishing, Autos, Pianos, etc.	50–100+
Sheet Metal Works:	
Miscellaneous Machines, Ordinary Bench Work	10– 15
Punches, Presses, Shears, Stamps, Welders, Spinning, Medium Bench Work	15– 20
Tin Plate Inspection	25– 30
Steel and Iron Mills, Bar, Sheet and Wire Products:	
Soaking Pits and Reheating Furnaces	5
Charging and Casting Floors	10
Muck and Heavy Rolling, Shearing, Rough by Gage, Pickling and Cleaning	10
Plate Inspection, Chipping	25– 30
Automatic Machines, Rolling, Wire Drawing, Shearing	10– 15

*The lowest figure should be considered a minimum, and the higher figure, good practice.

Open-Hearth Bucket



■ Lower pit cleaning costs and maximum conservation of crane time are the objectives of a new single-line hook-on type clamshell bucket recently developed by Blaw-Knox Co., Pittsburgh. It is specifically for rapid, intermittent and heavy-duty open-hearth service.

As much of the bucket weight as possible is located on the scoops or at the points where it does not have to be lifted while closing, thereby maintaining a maximum downward or penetrating force from the mass of the bucket.

The welded scoop construction has permitted forming the corners at a large radius, giving a continuity of strength and an even distribution of wear.

Larger size sheaves to accommodate larger cable are used. Moreover, the guide sheave and guide roller arrangement in the head of the bucket are improved and simplified to obtain conditions favorable to long cable life.

The dead end bracket is of an entirely new design in which the snubbing adjustment is accomplished merely by changing the position of a pair of plates, to which the dead end wedge sockets are connected.

When loaded the bucket is set down and tension on the line is released, the folding arms disengage and the scoops gently separate — thus allowing the bucket to open while being lifted. This permits safe automatic discharge.

REVERE TECHNICAL ADVISORY SERVICE

In many plants and industries, Revere Technical Advisory Service men are working shoulder to shoulder with executives and engineers in solving defense problems by selecting a suitable type and form of copper or one of the many copper base alloys.

These are picked men, with broad backgrounds in metal-working methods, plus highly specialized knowledge of copper and copper base alloy characteristics and applications. They are supported in this work by the full cooperation of the Revere Research Laboratories and Revere Mills.

This Technical Advisory Service comprises a thoroughly equipped Research Laboratory, manned by engineers and metallurgists for (1) developing new and better Revere materials to meet active or anticipated needs of industry; (2) supplying specific and detailed knowledge of the properties of engineering and construction materials; and (3) continuously observing developments of science and engineering with a view to their utilization in the improvement of Revere production methods and equipment.

In addition a corps of technical men are available to (1) help industrial executives make use of data developed by the Revere research laboratory staff; (2) perceive the material problems existent in industrial plants contacted; (3) assemble data enabling Revere research laboratory men to study these problems; and (4) make practical tests of the materials recommended in the plants concerned.

This Revere Technical Advisory Service set-up has been very successful in reducing costs, improving products and increasing the output for many industrial concerns.

Its service is available to you with no expense or obligation on your part.

MANY manufacturers entrusted with defense orders depend on sub-contractors for special parts. A "bottle-neck" for the sub-contractor becomes a "bottle-neck" for them. In the past four months, Revere has been able to eliminate not only many primary "bottle-necks" but many sub-contractors' "bottle-necks" too.

The Technical Advisory Service of Revere Copper and Brass Incorporated has been most helpful in cooperating with manufacturers in successfully stepping up production, reducing costs, and eliminating processing steps.

Revere is also equipped to furnish semi-finished parts such as cartridge cups and discs, rotating bands, forgings and industrial extruded shapes, in addition to the usual mill products such as rods, strips, sheets, or tubes. The services of Revere as well as its products are at your call.

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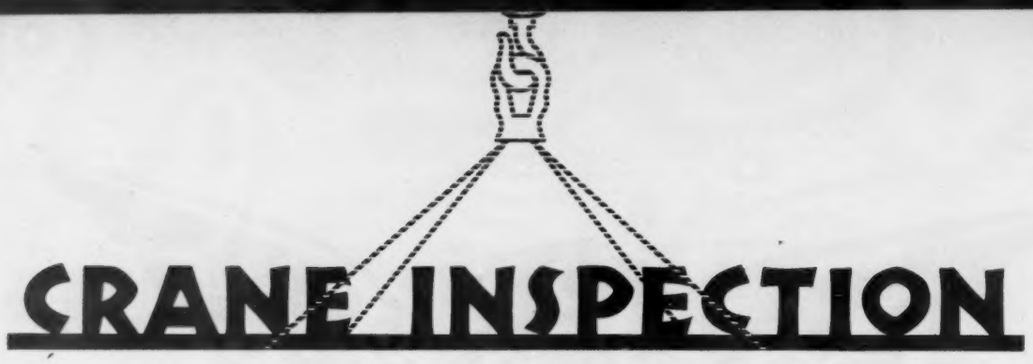

CRANE INSPECTION

A Maintenance "Must"

When cranes are needed, they are sure to be ready if a proper inspection and maintenance schedule is followed. Safety of men, equipment hinges on this important phase of plant maintenance

By F. L. SPANGLER
Mechanical Engineer

■ THE ONE class of equipment that must be kept ever ready for service is the overhead handling equipment. While usually a temporary substitute can be found when other equipment breaks down or must be taken out of service for repairs, the huge cranes that travel back and forth along the bays of factory buildings to move enormous loads cannot be replaced so easily. When an overhead crane goes out of commission, costs are bound to go up because of delays and changes to schedules, often resulting in idleness of crews and other unavoidable expense. That's why a definite schedule for maintenance and repair of cranes at regular intervals is as important as to set up a schedule for production.

It is not particularly difficult to program the maintenance and repair of cranes far enough in advance to prevent time interference with production schedules. It is largely a matter of setting up a thorough crane inspection schedule, then putting someone in charge who will see that this schedule is followed out and that the inspectors turn in complete reports.

One large manufacturing plant employs this method to insure that its cranes will always be ready when needed. The program has proved highly successful in reducing or entirely preventing crane trouble. This factory has 22 bays, all but one of which are served by one or two overhead electric traveling cranes ranging from 5 to 200 tons capacity. A 200-ton crane is no small piece of equipment. These cranes are used to transport semifinished material, machines, parts and assemblies.

Regular inspections cover crane ropes as well as other parts since the breaking of one or more strands makes a wire rope as useless as a burned-out motor and necessitates taking the crane immediately out of service for reroping.

Although a rope inspection is almost sure to reveal the extent of service still obtainable from the rope, yet an accident in handling the load or an unusual and unforeseen load condition may easily cause permanent rope damage. Naturally, it is a wise move to foresee the eventuality and provide all possible means for speeding up the reroping operation. This is accomplished in this plant by a well-trained maintenance crew and by the use of preformed rope. The value of preformed rope in such work lies in the ease with which it can be handled. This greatly facilitates removing the old rope as well as reeving and attaching the new.

The crane operators themselves will be of much help in keeping the cranes in operation if they will report promptly any unusual condition or situation encountered in their work. Such a report should be followed up by an inspection the first time the crane is idle. Generally, however, it is the inspector on whom the plant management must rely for a report on the condition of the crane and its various parts.

An overhead electric traveling crane has many parts—brakes, motors, controllers, wheels, bearings, gears—any of which, if not maintained in good condition, may cause a complete shutdown. Hence, it is of utmost importance that inspection be full and complete to reduce the possibility that any of these parts will be overlooked. In the plant mentioned, inspectors are required to make out in full a report covering all these parts and many more, these reports being made out monthly for every crane in the plant. Such reports make it possible to schedule repairs at times that will not interfere with production schedules.

Inspection, testing, maintenance and repairing are confined to Saturdays and Sundays, a period when the plant is shut down. On these days, motors, contactors, controllers, brakes, ropes and other parts are examined, and tests are made whenever necessary or desirable. Such maintenance routine as the lubrication of bearings, gears and ropes also is carried out on a similar schedule.

Wire rope deterioration proceeds most rapidly at the equalizing sheave, according to this plant's experience. This permits rope service life to be increased by shifting this point of wear from time to

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America is more healthful with these vegetables added to its winter diet, farmers have millions in extra income, food prices are lower -- all because of cans.

And this is only *one* use of steel. Our transportation, homes, clothing, amusements, national defense -- everything depends on steel for its material or on steel machinery for its construction. And steel, in turn, depends on *men* to make it right. Here at Youngstown we are constantly making improvements to keep our mills as modern as science can develop. But all the equipment in the world can't equal *men* in the making of fine steels. We are proud of our workmen who are spending their lives making the finest TIN PLATE that skill and care can produce.

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THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon and Alloy Steels

General Offices - - YOUNGSTOWN, OHIO

time. This is accomplished by cutting off 2 to 2½ inches of rope at one end of the drum. About once every 3 months is found to be often enough for this operation. Each time the rope is cropped, the point of most wear or deterioration is shifted a slight distance so this operation effectively increases the rope life.

When the rope is finally discarded, the damaged section at its center is cut out. Then the two remaining ends, if long enough, are used on cranes employing shorter ropes. This helps to obtain maximum service from these crane ropes. Here again, preformed rope is of value as it eliminates the necessity of seizing wires at rope ends and in addition, it has greater flexibility.

Inspection should be as rigorous with slings as with crane ropes. It is particularly necessary with chain slings since a chain failure can be foreseen only by a careful inspection. A wire-rope failure is apt to occur slowly enough that workmen will have time to get out of the way of the load at the first sign of failure. Regular and frequent inspection of either type sling will reveal its true condition and will allow it to be taken out of service before total failure.

The large fabrication plant mentioned uses slings made of chain and of preformed rope of improved plow steel grade. Hooks are employed on both types of slings, though some of the rope slings are of the structural erector type without hooks. All hooks are regularly examined for signs of stretching, since this is an indication of progressive failure. Those found in this condition are immediately replaced.

To facilitate the keeping of records on chains, all are given numbers. Inspection is made for bent and nicked links. Where a nick is deeper than ⅛-inch, the link is removed. Also, chains are annealed every 3 or 4 months, or whenever the surfaces at load-bearing points take on a polish that the trained eye of the inspector recognizes to be the result of work-hardening.

Rope slings used in this plant are of the equalizing type with two, three or four legs or of the structural erectors' type with a loop at each end. The equalizing slings have a ring that passes through a thimble at the end of each leg, while the free ends of the legs are equipped with hooks. Only preformed rope is used for rope slings employed in this plant, the preference being based on the claim that such rope hangs straight much as does a manila rope. Therefore the sling is easily and more safely handled and can be attached and detached from the load quickly. Preformed rope slings are easy to handle because all strands are bent or preformed to their final spiral shape before being closed onto the rope center. Hence internal stresses that cause twisting, looping and kinking of wire rope are virtually absent. Slings having several legs can be suspended without the ropes twisting around each other, and the riggers do not lose time in having to untwist or untangle the ropes when hooking on the load.

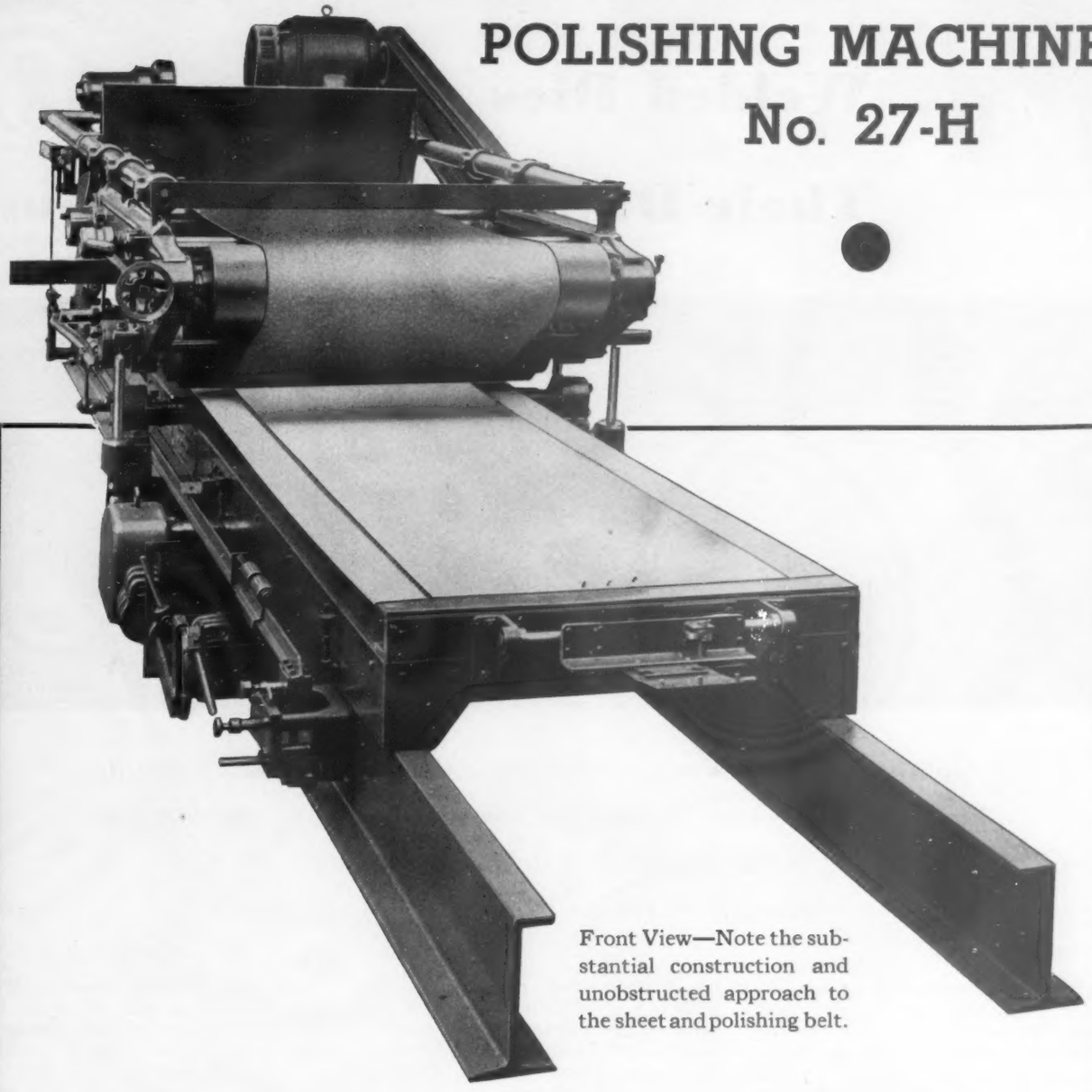
When a load is lifted by a rope sling having a loop end passing over the crane hook, the cross-section of that part of the sling bearing directly on top of the hook tends to become distorted, its original circular form changing into an ellipse. Continual spreading out of the rope section in this manner finally results in a considerable permanent deformation and a weakening of the rope structure at this point.

Upon inspection, rope slings so damaged should be discarded, even should the number of broken crown wires not be great enough to warrant abandonment of the sling from that cause. Where sling loops are equipped with thimbles, the distortion is not so severe and longer life can generally be expected.

A high degree of care and thoroughness in these matters is the best insurance against disruption of crane service. Management cannot afford to allow carelessness to creep into the routine of inspection and maintenance of cranes, ropes and slings.

A 15-ton crane in Chicago plant of Liquid Carbonic Co. supporting large section of a pasteurizer during fabrication. Right, maintenance of wire rope slings also is an important item in checking handling equipment

EXCELSIOR STAINLESS STEEL SHEET POLISHING MACHINE No. 27-H



Front View—Note the substantial construction and unobstructed approach to the sheet and polishing belt.

Stainless Steel Sheets Polished by Our Simplified Process, Eliminates Excessive Inventory and Delay

One Manufacturing Plant paid for the entire equipment in 8 months by saving the extra polishing cost previously paid for polished sheets.

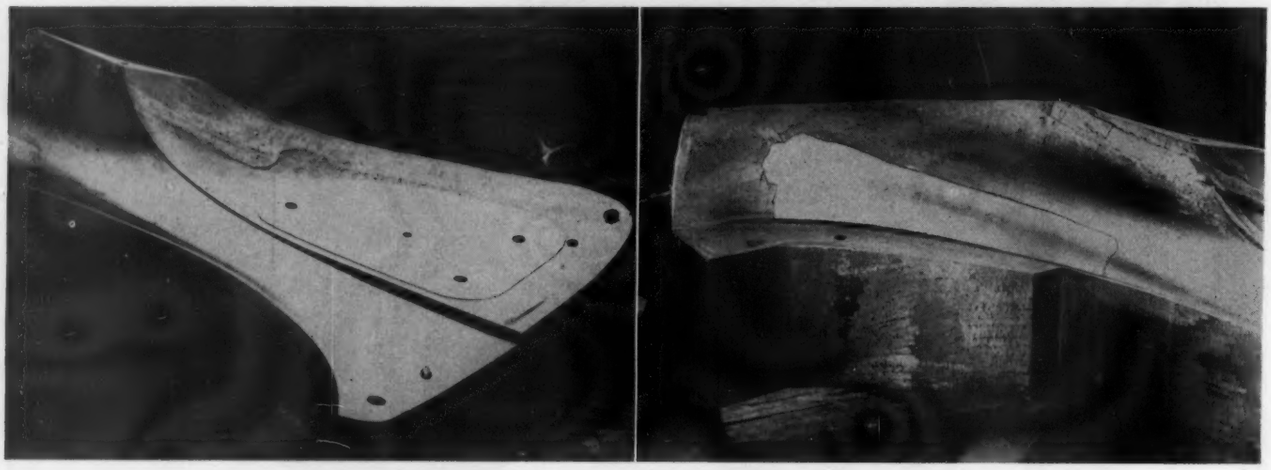
The Equipment requires no expert attention, is dustless and can be operated in any Assembling Plant by unskilled labor and has a capacity to produce a profit from $100.00 to $150.00 polishing sheets of the same dimensions and finish in 8 hours compared with the present price of polished sheets.

EXCELSIOR TOOL & MACHINE CO.

EAST ST. LOUIS, ILLINOIS

Welded Dies . . .

Their Design and Fabrication



Application of hard-facing metal deposits to critical points affords important economies in making new dies and in repairing old. Character of metal deposit and its heat treatment are varied to give desired results in operation of the die

■ WELDING now plays an increasingly important part in the vital tools of many a plant—the dies for blanking, trimming, drawing, forming, extrusion and a score of others. These tools are costly to make and require constant maintenance from wear in use.

Die welding methods are comparatively new. Although hard facing has been used to some extent for repair work, it has never before been used to the present extent. It consists of welding a layer of hard alloy on faces or edges subject to wear. As surfaces wear away in normal service, they may be refilled with new weld material.

Newer hard-facing applications involve making new dies as well as repairing old. It is necessary in some cases to have a hard wear-resistant surface with a tough base to resist shock. Alloy tool steels for this type of work are ordinarily expensive and inserts may be too costly or inconvenient. However, it may be possible to design the die to permit placing hard-facing welds at advantageous points throughout the die. In fact, the die may in many cases be completely covered. The choice of welding rod and base metal, if made correctly, will meet the specific requirements of the work easily.

Fig. 1. (Left)—Here a special drawing alloy is applied on belt line of an automobile quarter-panel die pad to eliminate scratching and marking the work. Base metal of die is cast iron. Finished ground

Fig. 2. (Right)—Application of special drawing alloy on reverse side of automobile quarter-panel pad acting as punch. Rough ground. Made to resist scratching. Base metal is cast iron

By A. R. BUTLER
Welding Equipment & Supply Co.,
2720 East Grand boulevard
Detroit

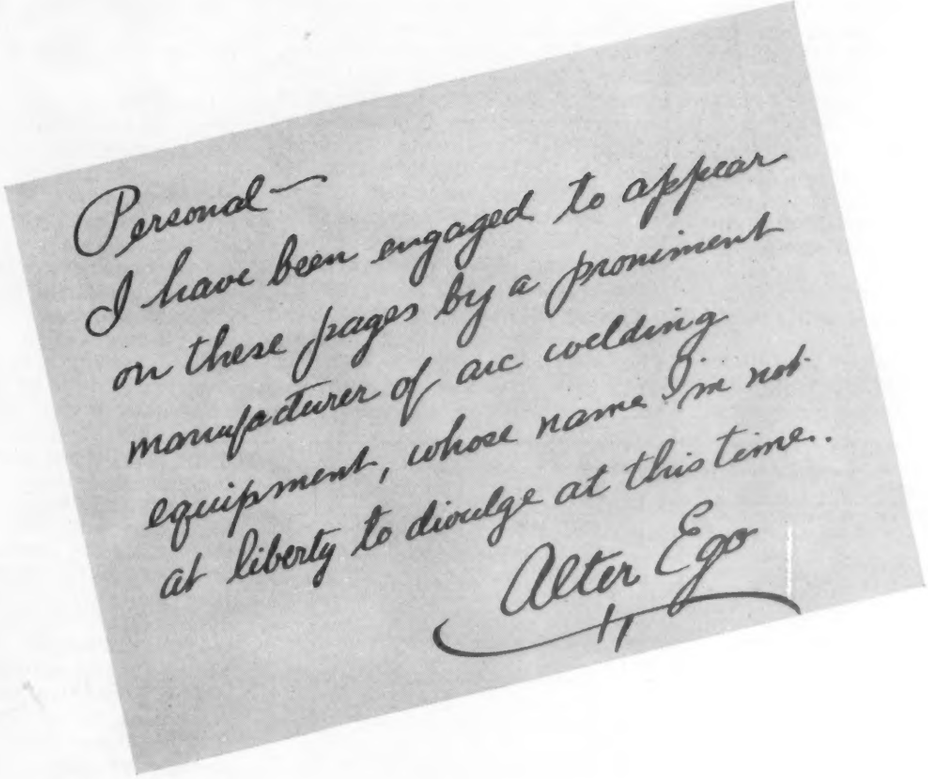
Part I

To choose rods and metal intelligently, one must know something about the physical characteristics and structure of both materials. Development and research in the welding industry now make it possible to fabricate some of these tools by welding a high-grade tool steel edge to a low or medium carbon base on trimming dies; welding special steels on forming dies in areas where abrasion is very severe; various alloys are also applied on cast iron drawing dies to resist wear and metal pickup.

These applications make it possible to secure results that cannot be purchased anywhere on the market today.

For example, by these inexpensive methods of fabrication it is possible to secure water hardening, oil hardening and air hardening cutting or forming edges on mild steel and medium carbon steel and deposits of superior alloys on cast iron drawing and forming contours.

Hard facing, as previously mentioned, is the welding of a hard constituent or a tool steel onto a softer metal to promote the wearing and


Personal—
I have been engaged to appear
on these pages by a prominent
manufacturer of arc welding
equipment, whose name I'm not
at liberty to divulge at this time.
Alter Ego

corrosive properties of the surface. Economies of the process include: Longer life of equipment, fewer replacements with resulting savings in labor charges and lost production time, utilization of cheaper base metal for wearing parts, salvaging or reclaiming of worn parts, saving in power consumption, general increase in operating efficiency, maintenance of desired dimensions within close limits and at low cost, ability to put type of surface needed at points desired.

Factors to be considered before actual fabrication takes place are the type of steel desired on the edge or area to be welded; the hardness or toughness characteristics required of the edge or area; the procedure or technique that should be employed in the actual fabrication or the welding operation.

In maintenance, practically all types of dies lend themselves to repair if proper procedure is followed. Blanking dies, trimming dies, embossing, coining, cold-forging and thread-rolling dies, flame-hardening steel dies, shear blades, drawing and forming dies, dies for hot work, and the like are readily repaired. The basic principles to remember in maintenance of dies by welding are as follows:

The analysis or type of tool steel to be welded. This is procurable from the manufacturer of the particular type of steel or from engineers familiar with tool steels.

Consideration must be given to the recommended heat treatment for the particular steel being welded.

Advisability of annealing after welding to facilitate machining or whether weld is to be made with no subsequent annealing to maintain original hardness.

Consideration of whether the steel is satisfactory for the operation it is performing or if a more suitable type can be used in certain areas.

Typical analysis and heat treatment recommended of various classifications of tool steel follow:

Typical Carbon Tool Steels—Average Analysis: Carbon ranging from 0.60 or 0.75 to 1.35 or 1.45 per cent; manganese 0.20 to 0.35; silicon 0.15 to 0.25; phosphorus 0.025 maximum; sulphur 0.025 maximum. Typical carbon vanadium tool steel—average analysis: Carbon ranging from 0.66 or 0.75 to 1.36 or 1.45; manganese 0.10 to 0.30; phosphorus 0.025 maximum; sulphur 0.025 maximum; silicon 0.20 to 0.35; vanadium 0.15 to 0.25. Typical heat treatment of carbon and carbon vanadium tool steels: Temperature for forging, 1600 to 1700 degrees Fahr.; for annealing, 1450 degrees Fahr.; for hardening, 1375 to 1450 degrees Fahr.; quench in water or brine, for drawing, 275 to 450 degrees Fahr.

Typical Oil-Hardening, Non-shrinkable Tool Steel—Average Analysis: Carbon 0.90 to 1.00 per cent; manganese 1.15 to 1.25 per cent; chromium 0.50 per cent; tungsten 0.50 per cent; vanadium 0.20 per cent. Typical Heat Treatment: Temperature for forging, 1550 to 1600 degrees Fahr.; for annealing, 1425 to 1450 degrees Fahr.; for hardening in oil, 1425 to 1475 degrees Fahr.; for drawing, 275 to 400 degrees Fahr.

Typical Oil-Hardening Steel, Regular—Average Analysis: Carbon, 1.10 per cent; tungsten 1.75 per cent; chromium 0.60 per cent; vanadium, 0.25 per cent. Heat Treatment: Temperature for forging, 1650 to 1800 degrees Fahr.; for annealing, 1450 degrees Fahr.; for hardening in oil, 1570 to 1650 degrees Fahr.; for drawing, 300 to 600 degrees Fahr.

Typical Air-Hardening Tool Steel—Average Analysis: Carbon 1.00 per cent; manganese 0.90 per cent; silicon 0.30 per cent; chromium 5.25 per cent; molybdenum 1.00 per cent. Heat Treatment: Temperature for forging, 1650 to 1950 degrees Fahr.; for annealing, 1550 degrees Fahr.; for hardening in air, 1700 to 1775 degrees Fahr.; for hardening in oil, 1600 to 1650 degrees Fahr.; tempering range, 350 to 1000 degrees Fahr.

Typical Tool Steel for Hot Work—Average Analysis: Carbon 0.32 per cent; silicon 0.90 per cent; manganese 0.30 per cent; chromium 4.75 per cent; tungsten 0.75 per cent; molybdenum 1.00 per cent. Heat Treatment: Temperature for forging, 1500 to 1850 degrees Fahr.; for annealing, 1500 to 1550 degrees Fahr.; for cooling in air, 1800 to 1900 degrees Fahr.; for quenching in oil, 1750 to 1850 degrees Fahr.; for drawing, 900 to 1100 degrees Fahr.

Experimental tests and actual practices have shown that in many cases welded or repaired dies outperform the original metal. It has also been found that the metallic arc method of welding dies is far superior. Tests were run to study the microstructures and hardness of various hard-facing welds applied by different processes of fusion welding. It was also to ascertain which type of welding is most suitable for a particular type of job or the type of welding giving the best results. The scope of these tests included three main types of welding operations on three main types of welding material—water-hardening, oil-hardening and air-hardening tool steels. Results of the hardness tests are shown in the graphs. Microstructure studies bore out the results shown in these hardness graphs.

Water-Hardening Types: Fig. 3 shows that in all cases of the "as welded" condition the hardness increases at the area near the weld. The metal *has* been affected by the welding process. The reason for this increase in hardness is that the metal near the weld has been heated above the critical transformation line and that a change of structure took place. When the welding was completed, the piece began to cool to room temperature. Rate of cooling was not the same because the

(*Please turn to Page* 136)

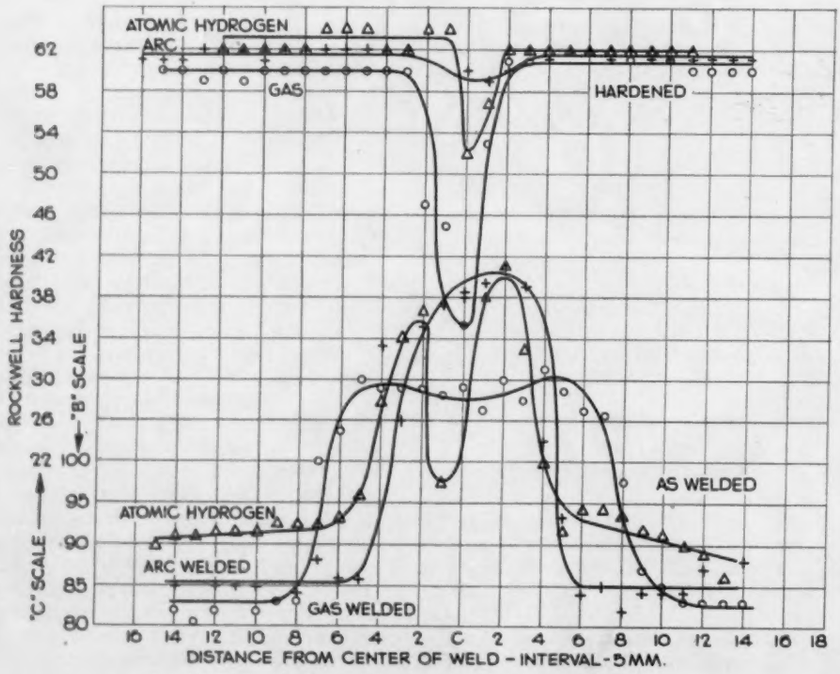
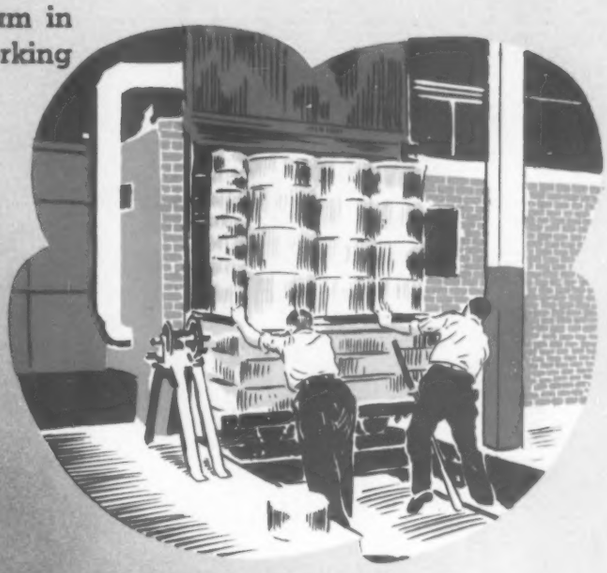


Fig. 3—Hardness of water-hardening type welds and base metal according to distance from center of weld. Note how curves differ for various types of welding

Better Grinding Wheel Production Facilities —Better NORTON SERVICE

The extensive Norton plant modernization program in the interest of Norton Service to the metal working industries is now nearing completion.



New plant buildings permit greatly improved facilities:

- —new tunnel kilns for increased burning capacity
- —more and better equipment for such operations as truing, bushing, balancing, testing and grading
- —an extensive conveyor system for easy handling without loss of time

A new department for organic process wheels (resinoid, rubber and shellac bonded) is equipped with the most modern press and oven equipment.

Alundum and Crystolon abrasives are being produced at the Norton electric furnace plant in both variety and quantity greater than ever before.

NORTON ABRASIVES

HANDLING HEAT
for the Metal Working Industries

NORTON SERVICE

Melting Metal . . .

Resistance to high temperatures, chemical resistance toward oxides and low permeability toward molten metals — these are the features of Norton Cements and Bonded Shapes (Alundum, Crystolon and fused magnesia) that are reducing lining costs in many types of furnaces for melting ferrous and non-ferrous metals.

Norton Cements and Bonded Shapes for Melting Metal

Sintering Metal . . .

Because they have high electrical resistance even at elevated temperatures, high refractoriness, high heat conductivity, high permeability and low coefficient of expansion, Alundum Tubes are showing outstanding performance in high temperature, wire wound electric resistance furnaces of all kinds — especially in the drawing and swaging of tungsten and molybdenum wire and sintering cemented carbides for tools.

Alundum Tubes for Sintering Metal

Hardening Metal . . .

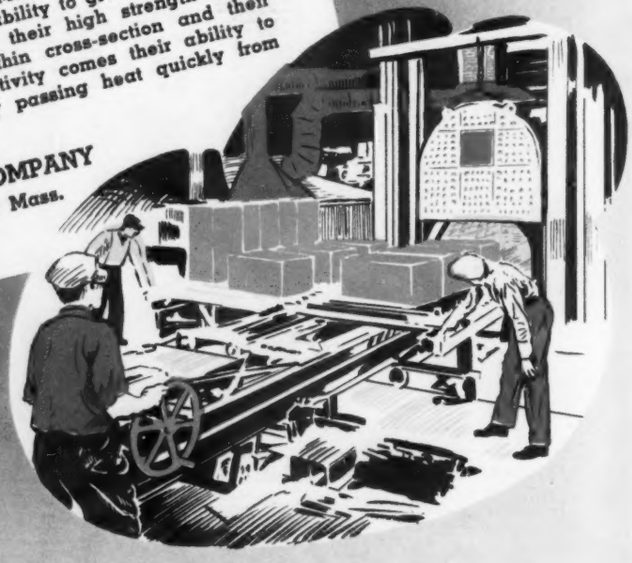
High refractoriness, great strength, high heat transfer, resistance to spalling and resistance to abrasion — these five features of Crystolon Hearth Plates and Crystolon Muffles are assuring long lining life and low fuel costs in heat treating furnaces of many types.

Enameling Metal . . .

From the high refractoriness and chemical stability of Alundum Muffles for enameling furnaces comes their ability to give long, trouble-free service. From their high strength which allows plates of thin cross-section and their high heat conductivity comes their ability to cut fuel costs by passing heat quickly from source to work.

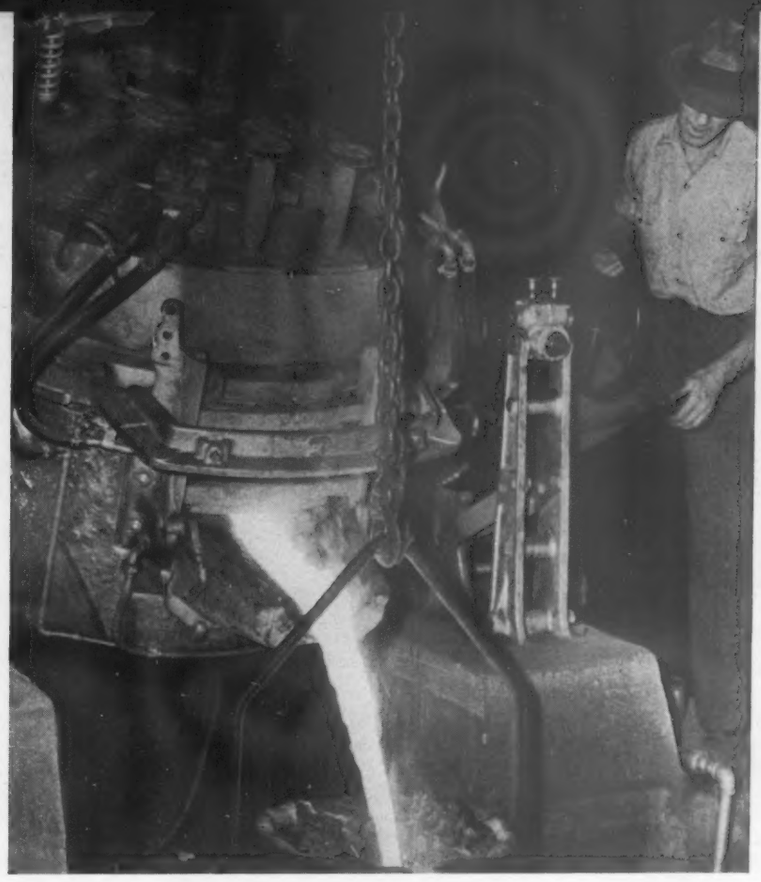
NORTON COMPANY
Worcester, Mass.

Crystolon Hearth Plates for Hardening Metal



Alundum Muffles for Enameling Metal

NORTON REFRACTORIES



Pouring a heat of alloy steel from the 1000-pound per hour electric furnace

New Custom Alloy Shop

Valley producer who originally made alloy steel in a home-made open-hearth furnace in his backyard now uses electric furnaces for the manufacture of abrasive-resisting grades in pound lots

By GEORGE R. REISS

■ ONE OF THE SMALLEST commercial steel plants in the United States is located in Youngstown, O. Instead of measuring its output in the thousands of tons of steel, it measures it in the hundreds of pounds. Its products, instead of being dumped unceremoniously into railroad cars by giant cranes, are handled as delicately and as cautiously as the finest chinaware, or gold or silver products.

The plant is that of the Youngstown Alloy Casting Corp., and, peculiarly enough, principal customers are the largest steel corporations. The plant's principal products are seamless pipe mill plugs, bar mill guide shoes, and other difficult alloy abrasive-resisting steel castings on which it has reduced necessary and expensive machining to a bare minimum by unusually high degree of skill in casting to accuracy. Approximately 22 different kinds of alloy steels are made including the use of such elements as copper or chromium to nickel or silver, to suit the customer's needs. Small jobs calling for only a few pounds or a few hundred pounds of alloy steel for special needs are handled.

The Youngstown Alloy Casting Corp. stands as perpetual proof that there still is plenty of opportunity for the small business. The plant is operated by Jack Trantin, who now is president, treasurer, and chief metallurgist as well as founder of the company, and it gives him the opportunity to work at his hobby, namely, the development of alloy steels.

Mr. Trantin studied chemical engineering and specialized in metallurgy in the University of Wisconsin. He became increasingly interested in the subject of metallurgy, particularly in the "can't be solved" problems. He spent all his spare time and money and energy in studying metallurgy and experimenting. Upon completion of his college course, he became associated successively with the metallurgical departments of the Illinois Steel Co., Lackawanna Steel Co., International Harvester Co., Minneapolis Electric Steel Casting Co. and others.

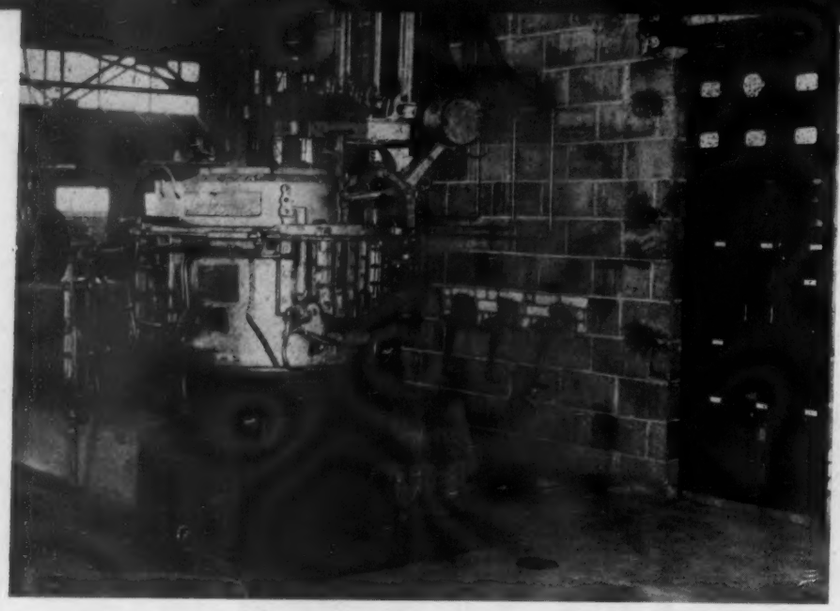
At 26 years of age, Trantin was foundry foreman at the plant of the Piston Ring Co., Muskegon, Mich., employing about 60 men and earning $50 a week. All was well, but Trantin was dissatisfied. The job was too routine, and after all he loved to work with alloy steels, not with iron. He decided to quit. But his boss refused to accept his resignation, indulgently offering him a raise to $75 a week. Trantin refused it.

"One hundred a week," the boss offered.

"No," replied Trantin.

"One hundred and fifty dollars—three times your present salary," the boss offered.

Quaking inwardly, Trantin also turned down that offer, taking instead a job at 40 cents an hour—or $16 a week on a 40-hour work week basis—at a nearby steel foundry as



This unit which operates on 2300 volts is the second electric furnace to be installed by the company

a molder's helper. He drifted from one steel plant to another.

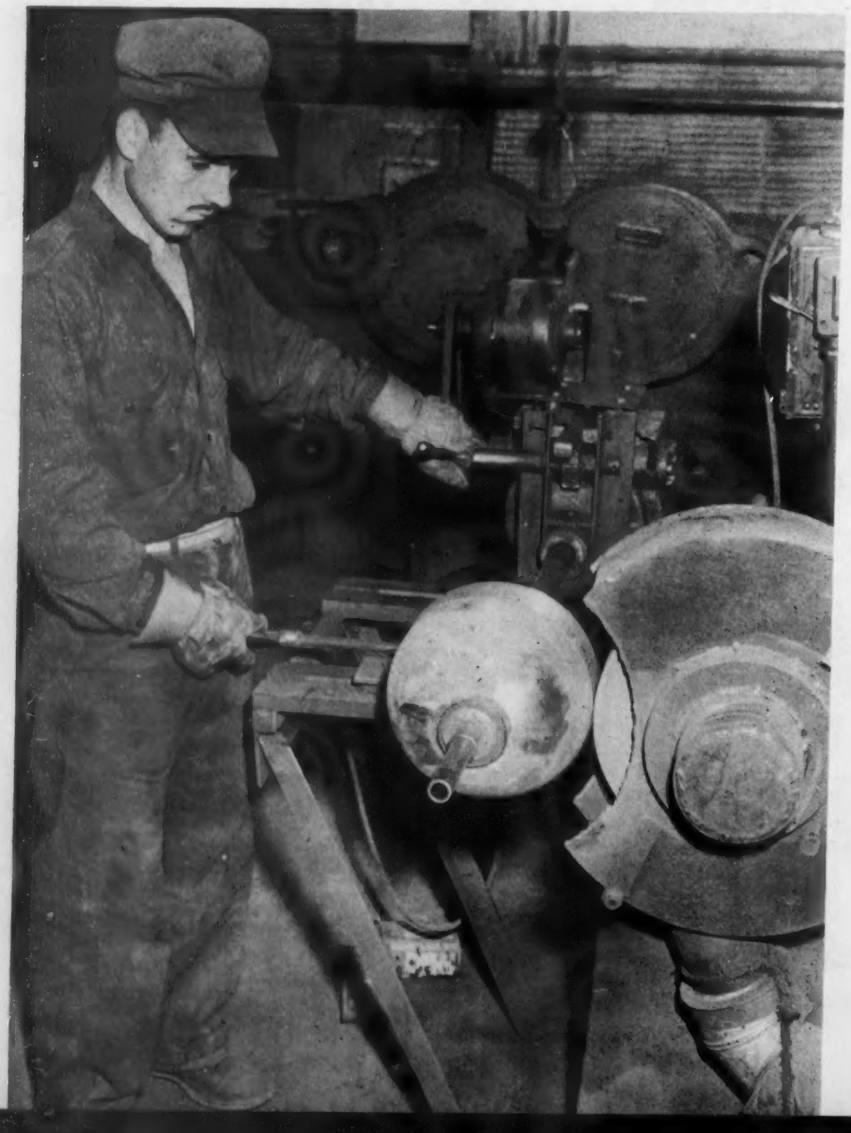
One day he happened into a seamless tube mill where considerable trouble was being experienced with guide shoes made of cast iron, the shoes wearing out every three or four hours and requiring 15 or 20 minutes for replacement.

"Let's see," said Trantin, calculating rapidly, "that means you're wasting $100 to $150 worth of time alone every time you change one of those shoes."

"Right," the seamless tube mill superintendent agreed. "What we need is a seamless tube guide shoe that won't wear out."

"I'll make you one," offered Trantin.

The mill man laughed indulgently:



"If you do, it will be worth a lot of money to you—but I don't think it can be done. Others have tried it before, you know, and we've always had to come back to the cast iron ones."

No, he didn't produce one which wouldn't wear out, but he did produce one which would last many times the life of the old guides. For example, one large steel concern reports the average life of old guides was 71,000 pounds, but that 2,949,000 pounds had been produced on one set of alloy guides which had been dressed four times; at another plant 22,312,000 pounds of bar was produced on a set of alloy guides which had been dressed 12 times, and still another rolled 18,470,000 pounds on a set of alloy guides.

Six years ago, Trantin found himself without much money or a job, but faced with a good demand for bar and pipe mill guides. He resolved to set himself up in business. He chose Youngstown, O., because it was centrally located for the plants he wished to reach. Then he combed the Youngstown junk yards, buying a piece of needed steel here and another part there. He bought a quantity of firebrick and fire clay, and with the pieces of metal he had secured at the junk yard, he built a small open-hearth furnace in his backyard. And it probably was one of the smallest such furnaces ever built, having a capacity of about 500 pounds per melt, against 125 to 175 tons for most of the Youngstown district open hearths. But this small outdoor furnace was big enough for Trantin's needs.

Uses Spent Oil for Fuel

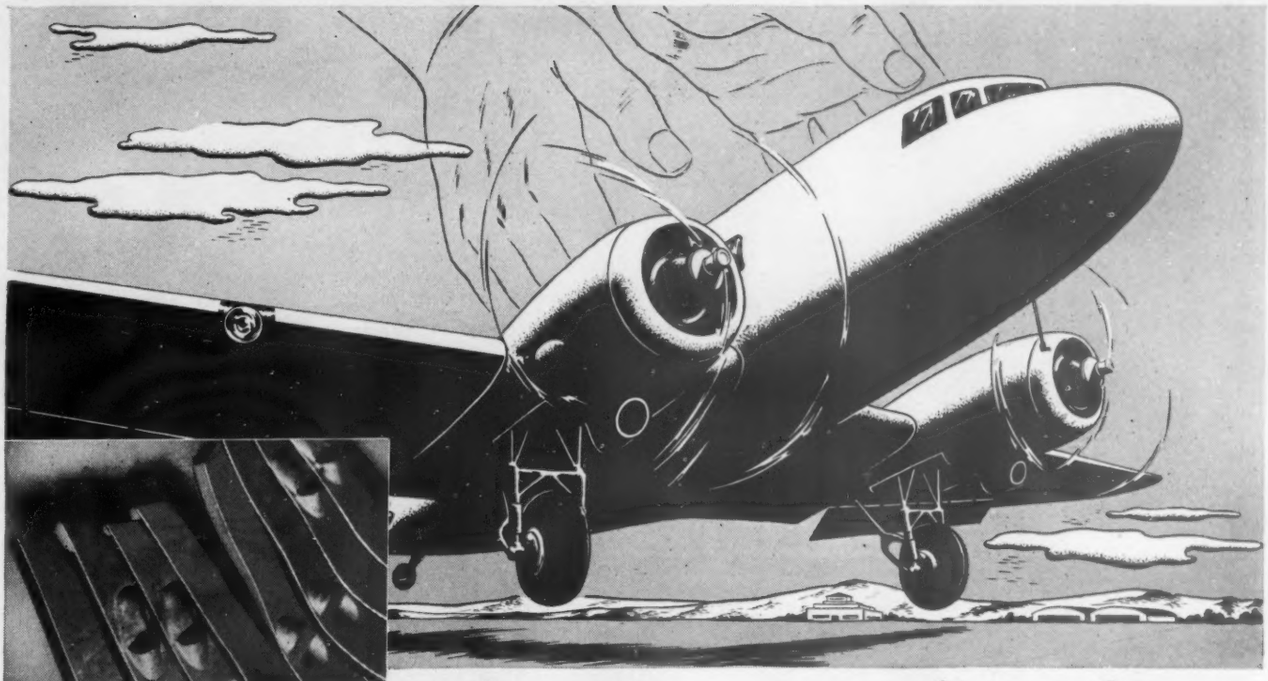
Crank case drainings from automobile filling stations were used for fuel. The filling stations, at first, were reluctant to give or sell him this waste oil, fearing he planned to refine it and sell it in competition with them, but finally, when he convinced the station operators, they furnished a sufficient supply of old oil.

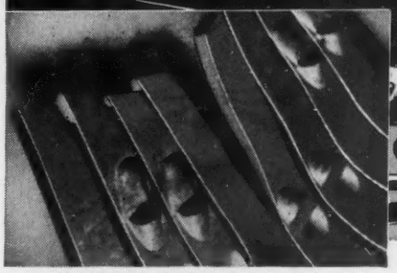
Here, in the backyard of his home, Trantin cast many sets of guide shoes for some of the large pipe and seamless mills. Between casts, he combed the steel plants for orders, and in this, his knowledge of metallurgy and steel castings, and his acquaintanceship in steel plant metallurgical departments were of great assistance.

Soon more business was secured than could be handled in his backyard, which wasn't such a pleasant place to work, especially in times

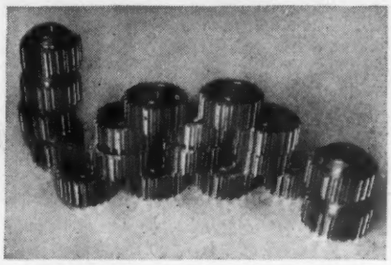
(*Please turn to Page* 139)

Pipe mill plug being ground to specification

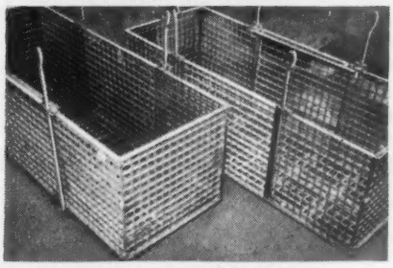




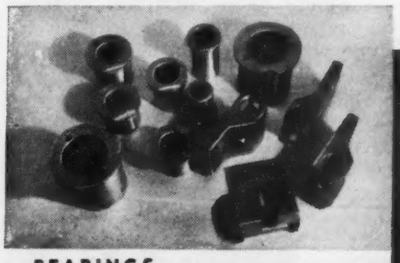
FORMING DIES . . .
— where AMPCO METAL'S hardness, its resistance to pitting, wear and impact result in exceptional accuracy and long life.



GEARS . . .
The toughness and wear resistance typical of AMPCO METAL recommends it for all types of gears, ranging from a fraction of a pound to hundreds of pounds each.



PICKLING EQUIPMENT . . .
AMPCO METAL'S great resistance to corrosion makes it widely used in this type of service, and wherever else corrosion is a problem.



BEARINGS . . .
AMPCO METAL is probably more widely used for bearing service than any other bronze. It is noted for its stubborn resistance to wear, "squashing out" and shock loads.

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A critical moment — as plane and ground meet. If vagaries of wind and timing make the meeting a rough one, the landing gear must safely absorb severe impact.

At points of greatest stress and shock in the landing gear of plane after plane, AMPCO METAL is used . . . undeniable proof of the greater strength and longer wearing qualities of this dependable bronze.

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In other industries, as in aviation, you'll find AMPCO METAL widely used wherever exceptional durability and resistance to impact, fatigue, wear and corrosion are required. It enjoys a unique reputation as "the metal that makes good when all others fail."

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Maybe AMPCO METAL can master a troublesome job for you. It's made in many grades and forms. Tell our engineering staff what you're up against, and they'll be glad to supply complete data and recommendations. There's no obligation. Write

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Truck Axle Parts

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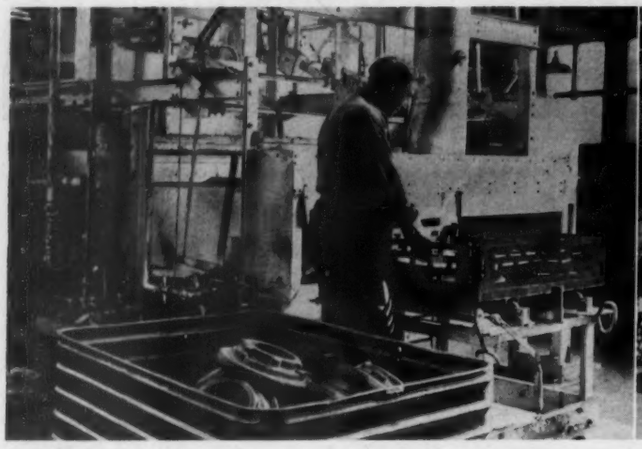

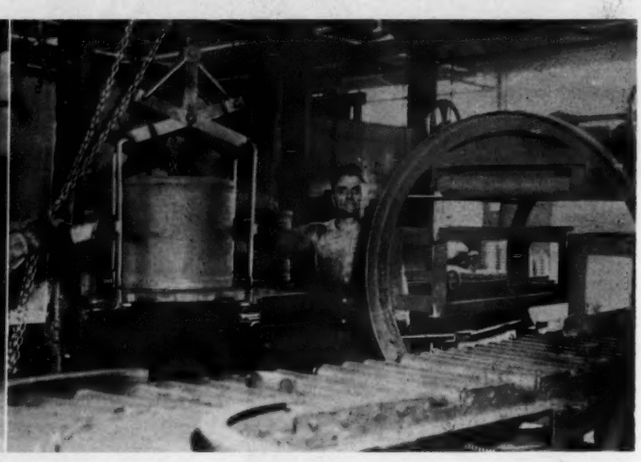

Fig. 1, left, shows unloading station of gas fired furnace for bright annealing. Fig. 2, right, is a 4-row pusher-type roller-rail pot carburizer burning natural gas

By FRED B. JACOBS

■ EARLY days of the automotive industry some 40 years ago is a never ending tale of stripped gears, broken axles and other mechanical failures. Mechanical failures and subsequent costly repairs were taken as a matter of course. Yet in the early days, a few men of vision sensed the possibilities of the motor truck and a new industry was born. Causes of mechanical failures were studied and it soon was found that correct heat treatment reduced such failures to a minimum.

A vital element of any modern motor truck is the rear axle, for this unit must be strong enough to stand up under heavy stresses and high speeds. Eaton Mfg. Co., Cleveland, manufactures truck axles of various kinds. Here correct heat treatment of axle components by modern equipment operated under the direct supervision of metallurgical engineers eliminates all guess work. Temperatures and lengths of heats are all controlled automatically.

Inasmuch as the majority of parts entering into axle construction are machined automatically, it is necessary that the raw material, in this case drop forgings, be of even texture. Otherwise expensive cutting tools would require constant replacement. Thus the first step is to anneal all drop forgings before they pass into production.

One type of annealing equipment is shown in Fig. 1. This is a bright annealing furnace, gas fired by 13 radiant tubes. Flame does not come in contact with the work.

Referring to Fig. 1, the operator is shown at the unloading station removing work from a basket that has just emerged from the furnace door at the left. Work enters through the door at the right. The transfer car on which the basket of work is located serves both doors as it runs on a track laid for this purpose.

Work entering the furnace first passes into a vestibule with doors at the front and back. This furnace is of the roller rail type while the work is pushed through by means of hydraulic pushers, set in motion automatically when the vestibule rear door is opened. Work is conveyed down one side of the furnace where it is heated to a temperature of 1700 degrees Fahr., passes across the back and then is returned to the unloading station. The work gradually cools on the return journey. Regulation of temperature and the operation of the hydraulic pushers is automatic. The only manual operation is the opening of the vestibule outer doors.

Various drop forgings passing through the annealing furnace include ring gears, bevel pinions, spiders, differential gears, etc. Fig. 1 also shows the kind of steel tote boxes used for transporting these parts. These boxes are hoisted by means of electric lift trucks and thus easily transported about the shop.

In spite of the great advances made in heat treating steel during the past quarter century or so, many early processes still survive. Pot hardening low carbon steel

You can quote me — **"AJAX-NORTHRUP INDUCTION FURNACES TAKE ALL THE ARTISTRY, HOCUS-POCUS AND EVEN LUCK, OUT OF THE PICTURE . . .**

ALLOY PRODUCTION IS NOW A SCIENCE WITH SPEED AND PRECISION...

and we can duplicate at any time"

Those are the exact words used by the Works Manager of the Driver-Harris Company, of Harrison, New Jersey, when asked his opinion of the value of AJAX-NORTHRUP Furnaces.

And he went on to say, "Our reputation is based not only on our ability to pioneer in the discoveries of new heat-corrosion resistant alloys, but to continue to deliver consistent analyses day after day and year in and out.

"The AJAX-NORTHRUP Furnace is the scientific tool that enables the metallurgist to express the quality of his fondest imaginations, in terms of the actual delivered product. It is the only furnace where the alloy is completed in the furnace and not in the ladle.

"We use it for strip, sheet, rods, wire and castings. Spare furnaces with different shells are inexpensive and enable us to make quick shifts in production."

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RODS
WIRE
CASTINGS

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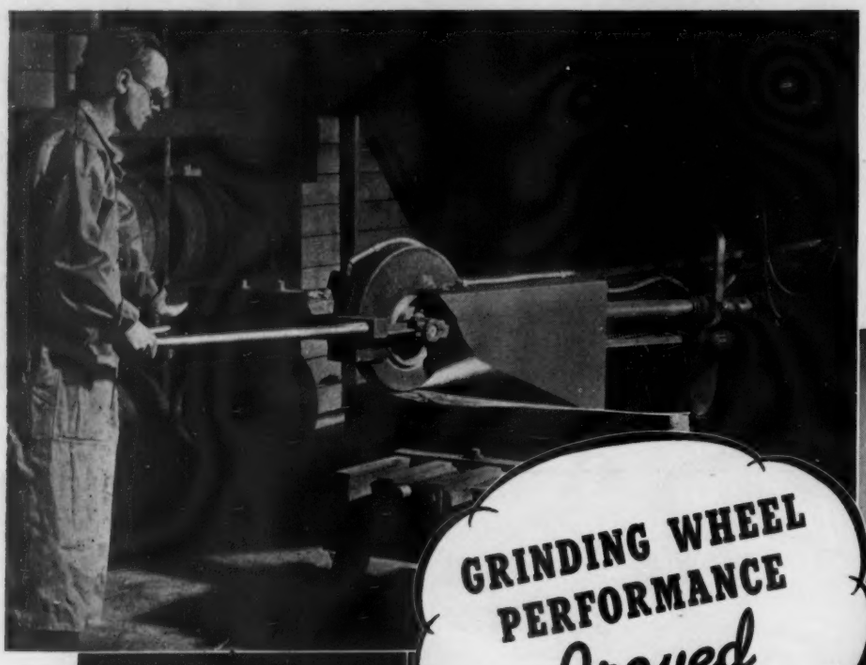
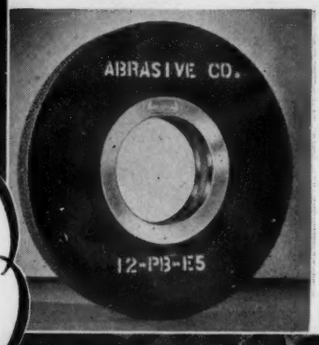
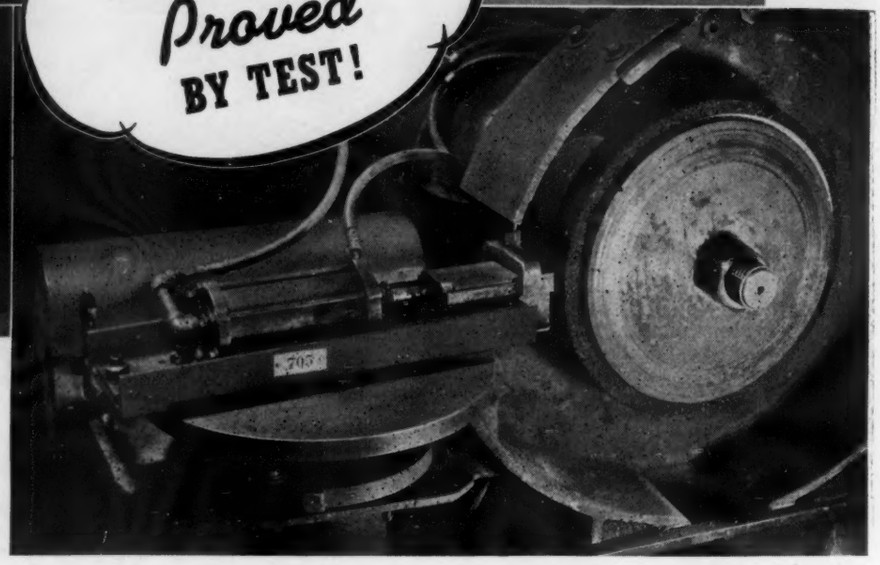


Swing frame grinder weighted for test grinding alloy steel billet to give constant wheel pressure on work.



GRINDING WHEEL PERFORMANCE *Proved* BY TEST!



Compressed air work feed device to give constant work pressure on stand grinder.

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Current operating schedules in the metal-working industries demand ever-increasing efficiency from tools, men and materials. In the field of grinding this is particularly true, and fortunately so, since grinding wheels are one product where efficiency may be readily demonstrated—by product performance.

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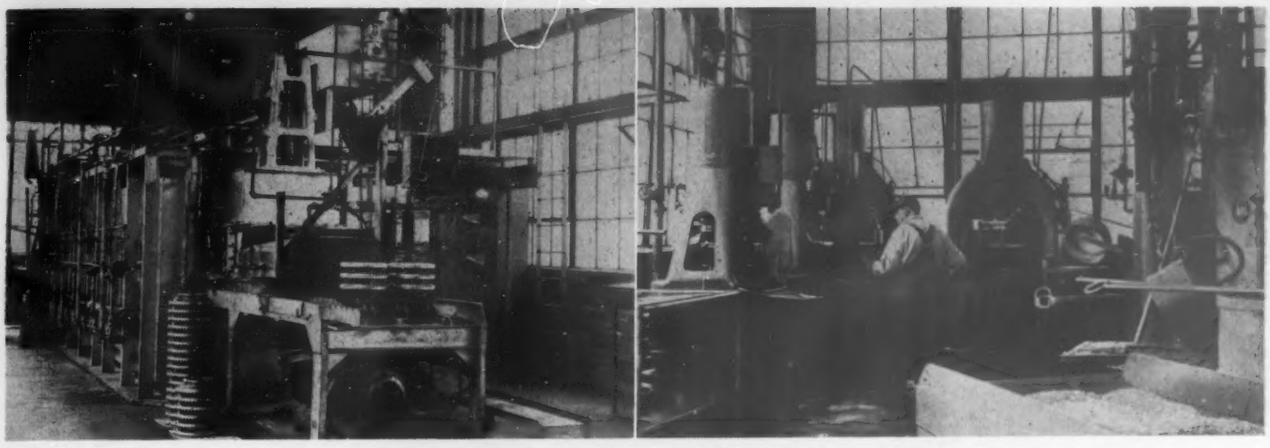


Fig. 3, left, is an automatic pusher-type gas carburizing furnace. Special auxiliary equipment, Fig. 4 at right, helps in handling the work and in controlling distortion

parts by packing them in bone dust or other carburizing agencies is typical. These parts then are heated and subsequently quenched in oil or water. While the process was thoroughly understood and applied to the hardening of firearm parts over a century ago, the mechanical equipment used has been improved greatly.

The unit shown in Fig. 2 is a 4-row pusher-type pot carburizer of the roller rail type. This unit burns natural gas which generates a heat of 1700 degrees Fahr. Fig. 2 shows the loading end of the furnace where pots loaded with parts and carburizing material are conveyed along the roller conveyor in the foreground. At the right is a device for turning the pots over as it often is advantageous to send them through the furnace upside down.

This is accomplished rather simply. The packed pot in an upright position is provided with a cover and then moved into the turnover apparatus. Here the cover is clamped securely in place and the turnover mechanism revolved 180 degrees. Then the upside down pot with the cover now at the bottom is picked up by the tongs shown in Fig. 2 and deposited on the conveyor which runs through the furnace.

At the unloading end of the furnace, the red hot pots are removed and the work is either direct quenched in oil or cooled in the pots depending on the type of steel and the kind of part. This furnace is used for carburizing a diversity of parts such as side gears, side pinions, spiders, drive pinions and ring gears.

A comparatively recent addition to the heat-treating equipment at this plant is shown in Fig. 3, a gas carburizing furnace in which a gas takes the place of carburizing compound. A mixture of natural gas and a diluted gas made by burning raw natural gas in a DX or gas generating unit, an integral part of the furnace, is employed as the carburizing medium.

Work is loaded on trays which are conveyed automatically through this furnace. The entire unit is controlled electrically, including the pusher mechanism which conveys the work. Fig. 3 is a view of the loading end of the furnace.

Ring gears coming from this furnace are die hardened to prevent undue distortion. Referring to Fig. 4, an operator with special tongs grips the red hot ring gear as it comes from the furnace and places it in a receptacle, one of which is shown in Fig. 4. Then he closes the cover. The gear remains in this receptacle one minute and then the cover automatically raises. The object of this short temporary cooling is to minimize distortion. Further cooling is done between dies in special presses as Fig. 4 shows. The operator places a gear in the press and the ram descends, immersing the part in oil for a period of four minutes.

While it is true that the furnace shown in Fig. 3 is used for carburizing and hardening the majority of ring gears, the unit shown in Fig. 2 also is used for pot hardening of some units. When the gears are heated in pots, the hot pots are conveyed by a chain hoist and trolley to the unloading table shown in the right foreground of Fig. 4. From here they are handled in the same manner as previously described.

As the furnaces shown in Figs. 3 and 4 are located some 15 feet apart, ring gears can be handled advantageously in either furnace. When production is unusually heavy, both furnaces are used.

Salt-bath hardening is also employed at the Eaton plant for hardening a diversity of parts such as bolts, screws, washers and other comparatively small units, as well as for hardening certain types of gears.

♦

Develops New Block And Pipe Insulation

■ Johns-Manville, 22 East Fortieth street, New York, reports a new 1500-degree insulating material called L-W Superex for use generally in stationary and marine power plant equipment and piping. Furnished in both block and pipe covering form it is suitable for use in industrial furnaces, ovens, kilns, high temperature mains and stacks.

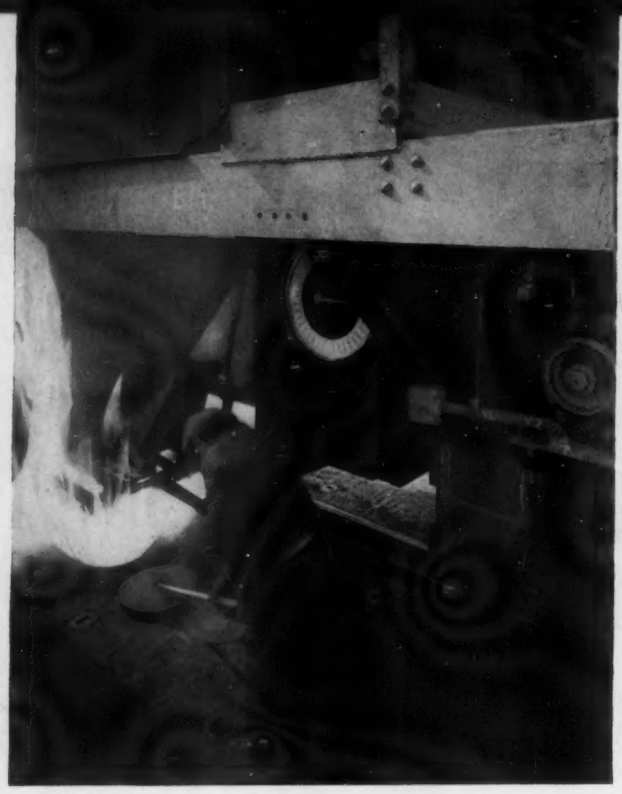
The insulation is of the molded diatomaceous silica type, but is light in weight, weighing only 20 pounds per cubic foot. The blocks are furnished 3, 6, 9 and 12 inches wide in standard lengths of 18 and 36 inches, and in thickness from 1 to 4 inches. Curved blocks also are available.

The pipe insulation is supplied to fit standard pipe sizes in sections or segments 3 feet long, and up to 2½ inches thick. Green ends distinguish it from 85 per cent Magnesia and H-T (1900 degree) Superex.

Small Device Uses Large Amounts of Steel

■ Among the items that require large uses of steel in small ways is a Sneak-Proof screen latch recently patented by Steel and Machining Co., Tulsa, Okla. It consists of a latch, three screws and a cover. When installed, it cannot be opened from the outside, but is easy to manipulate from the inside.

A mid-west chain store recently placed an estimated order for this device amounting to not less than 12,000 gross, the weight of cold-rolled steel and screws on this order representing a total of approximately 75,000 pounds.



Batches for coke ovens at Gary are being weighed automatically here

Weighing Stock Automatically While in Motion

Automatic weighers speed handling or loads, eliminate possbile operator errors, save time. Weighing loads in motion can be done on floor tracks, overhead monorails or roller conveyors

By B. T. CONNOLLY
Purchasing Agent
Streeter-Amet Co.
Chicago

■ THE WEIGHING machine is becoming an increasingly important aid to many industrial manufacturing and accounting practices where it justly belongs. This is the result of two factors—awareness of the scale manufacturer to the needs of industry and the trend of industry toward more efficient control of purchases and production. Efficient operation demands that the control of weight be accurate and that the weighing function be performed without holding back the movement of loads.

The machine that is meeting this need of accuracy and speed is the automatic weigher. In the great classifying yards of the nation's railroads, trains are not stopped on the scale to be weighed—a machine automatically stamps the weight of the cars as they roll over the scale in motion; cars in the mines or in the steel mills move over the scale as fast as one every three seconds, and the automatic weigher clicks off each car and prints its weight.

Loads that cannot be handled in motion are also moved faster because their weight is mechanically printed the instant the scale is in balance. In some instances, weight is indicated or printed right at the desk of the accountant, for remote weighing control is now an accepted operation of the automatic scale.

Motion weighing is defined as the weighing of applied loads without causing them to come to rest on the load receiving element of a scale. While the term is generally used with reference to the weighing of cars on a track while the cars are in motion, the method is also adapted to the weighing of loads on a monorail or a roller conveyor and so may be applied to speed up many factory production operations.

Motion weighing is accomplished by the automatic weigher which is installed complete with scale levers, or as a weight-recorder attachment for any scale in good condition. The weight recorder designed for weighing railroad cars attaches to the tip of the hand beam. On scales of a lower capacity, the weight recorder replaces the hand beam. The load weight is transformed by sensitive mechanism of the weight recorder into printed records on a continuous paper tape or on a weight ticket form in single or multiple copies.

Motion weighing is not new. Insofar as can be determined it was originated by the Streeter-Amet Weighing and Recording Co. in 1888; just 52 years ago. At that time it was essentially a problem of railway transportation and a fairly simple one at that. Cars were small in capacity, uniform in length, and railroading in general was not the complex problem it is

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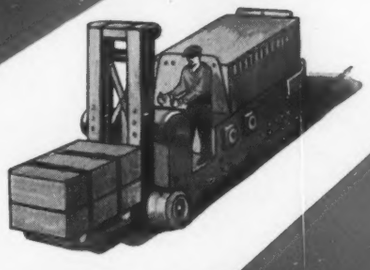
From "Automatic and Motion Weighing" by B. T. Connolly, purchasing agent, Streeter-Amet Co., Chicago, by courtesy "Chicago Purchasor," published by Purchasing Agents association of Chicago, Hotel Sherman, Chicago.

Give your industrial trucks 34% MORE POWER



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With Exide **MIPOR** Separators
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EXIDE-IRONCLAD BATTERIES assembled in steel trays pack greater battery power into the same space. In a typical instance, a battery with 34% more power and 20% higher voltage was installed in the battery compartment of an electric industrial truck.

The inevitable result is more power for heavier loads and steeper grades, greater speed, pep and liveliness... and more materials, steel coils, freight or cargo handled every hour of the day.

The Exide System is a further contribution to today's handling demands. It scientifically determines the right size and type of Exide-Ironclad Battery for your needs. It guards against costly delays and "tow-ins" with the help of the Exide Discharge Indicator. And it makes battery charging as simple as rolling off a log by means of the Exide Charge Control Unit.

Write for new, free booklet, "The Exide System for Better Material Handling."

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The World's Largest Manufacturers of Storage Batteries for Every Purpose
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YOU can avoid the costly annoyance of loosened parts by using EVERLOCK WASHERS in your assemblies . . . The powerful spring tension of every EVERLOCK WASHER tongue coupled with the bite of its teeth, does the job more thoroughly than other types of fasteners . . . Pictured is an enlarged EVERLOCK tongue and a few of the different types that are used by the millions on a vast variety of products . . . Service calls due to loosened nuts, bolts and screws on equipment where EVERLOCK WASHERS are used, is unknown . . . There's an EVERLOCK WASHER of the correct type and size for every purpose.

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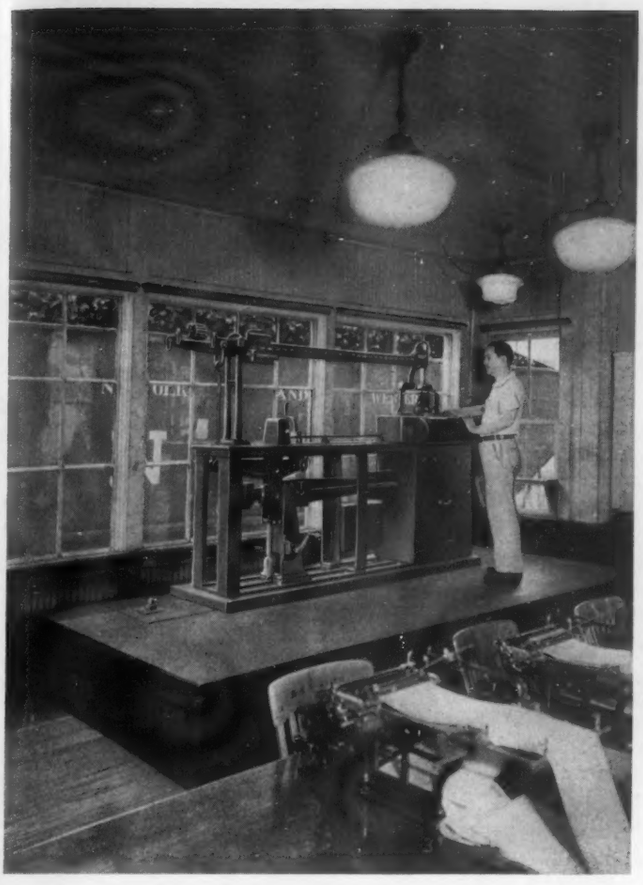


Left, railroad scale at Portsmouth, O., one of world's largest classifying yards. Above, weighing automatically on overhead conveyor

now. Later the bituminous coal mining industry took up the idea for weighing coal between the mines and the railway cars for the dual purpose of production control and of determining the wages due miners. With the tendency to specialization in industry motion weighing was found to be a virtual necessity in handling iron ore from the mines. Then, the durable goods industries such as steel mills and foundries fell in step in the handling of materials in production lines.

In railroad weighing the original problem was to weigh cars coupled in train and moving. As improvements in rolling stock occurred, cars became varied in length and this method no longer became generally possible.

Industrial Uses: In the present day, these railway cars are weighed uncoupled while moving over the scale which is located on a grade usually in the throat tracks of a classification yard. Cars are pushed up to the hump by a locomotive. As each car reaches the apex of the hump, it is cut loose from the train and allowed to drift over the scale at a rate of speed that will keep it on the scale a sufficient length of time to permit the weighing function to be completed. As each car clears the scale, the car behind is allowed to proceed over the scale, and so on. The weighing function is entirely automatic. An automatic weight recorder balances off the load, sets up the weight to be printed, and prints this weight when the leading wheel hits a trip located at the exit end of the scale. At one location, more than 2200 loaded railway cars are weighed in a single day.

Think what such a device could do on a monorail or roller conveyor to check or measure material to continuous batching machines, incoming raw material stocks, outgoing shipments to shipping departments or storage, and many other points in processing and fabricating plants.

The weight record may be printed on cards or on a continuous roll of tape that rewinds itself inside the machine.

At a limestone quarry on the west shore of Lake Huron, stone is moved to storage bins 1¼ miles out in the lake by buckets from the head house out to the storage bin. The bull wheel dispatches a bucket

(*Please turn to Page* 141)

Exterior and interior views of coupled motion weighing of charges for open-hearth furnaces, Indiana Harbor, Ind.

BETWEEN HEATS WITH *Shorty*

■ Say Fellers:

One day last week Ol' Tug Saylor dropped in at the office. Tug used to be a roller over on No. 10 hot mill. He sez, "Shorty, what's the chances of gettin' a pass to get into the mill so as to go over and see some of the boys?"

I sez, "Ol' Timer, there isn't a chance in the world of y' gettin' a pass. All y' gotta do is to walk through the gate. The plant 's all yours, Tug."

"Sorta sounds like a kid I used to know when I worked out at the ol' Morewood plant at Gas City, Ind.," he sez. "You'd ask him to do somethin' fer y' and say, boy, nothin' was too much trouble for 'im.

"Charlie was his name and he came from 'round Cincinnati, I think. He got 'is first job there as an office boy in the ol' plant of the Cincinnati Rolling & Tin Mill Co. He told me they paid 'im $2 a week but he wasn't satisfied. He got the itch sittin' on the high stool at the desk and so he sez to himself, 'why don't you learn to figure bar weights and then get yourself a skilled job?' "Y' know, Shorty—so many pounds of sheet bar to make a certain size sheet. Well, that's what Charlie wanted to figure. N' by gosh, he did. He was slick at figurin' when he was at our place."

I pressed Tug for more information 'bout Charlie, as he called 'im, and he sez: "Watch your curiosity, son; it's pullin' at the leash. He was doin' office work when he first came to the ol' Morewood plant but I remember 'im comin' out on the hot mill floor one day and walkin' up to ol' man Lewis, the roll turner. Y' shoulda seen the lad. He was all dressed up in office togs—with a set of black shirt sleeve protectors held in place with gum bands near his elbows. He had 'is cap cocked on the side of 'is head. We were rollin' 28 gage that day and she was plenty hot all over the mill. There Charlie stood with 'is hands on his hips and sweat pourin' down over 'is forehead and cheeks. He sez:

" 'Mr. Lewis, word has reached me that you'd like to know somethin' 'bout office work and how to wear a pencil back of your ear. Is that right?'

"Ol' man Lewis reckoned that it was and so Charlie speaks up and sez: 'I betcha you're jus' like me. I'd like to know somethin' 'bout rollin' sheets and I'll tellya what let's do. I'll tellya all I know 'bout office work if you'll 'xplain all 'bout roll turnin'. Is it a bargain?' N' then Charlie grinned n' waited for the ol' man to answer."

What Did the Ol' Man Say?

"He didn't say anything for some of the roll hands chimed in and sez, 'Son, y' can't turn rolls 'less you're a heater or a doubler or a roller on the mill, dontcha know that?'

" 'That so,' sez Charlie as he wiped his brow and cocked his hat on the other side of his head. Then a big smile broke over his face and he sez, 'Alright, fellers, what's the chances of comin' out on the floor and gettin' a job heatin' on one of the mills?'

"Ol' man Lewis spoke up and sez, 'Y' don't have to do that, my lad. Come out to the shop next Sunday.

"That was jus' like stickin' a spur into the side of a horse, for Charlie not only came out that Sunday mornin' but every Sunday mornin' for the next 18 months. N' when ol' man Lewis finished with Charlie, he had 'im turnin' rolls in the housin's like y' had to do with the ol' English type mills. N' what's more—when Charlie finished with ol' Mr. Lewis he had 'im wearin' pencils back of both 'is ears n' writin' figures in the debit and credit colum' and strikin' balances that would put addin' machines to shame."

"Suppose they paid the lad pretty well for Sunday work, Tug?"

"As I recall he got 'bout $2.50 for 'is Sunday trick. He had the habit of puttin' everything down in a little black book he carried with 'im. I had a squint at it once and he had written: One bucket 25 cents and a cake of soap 5 cents. I sez, 'Charlie, whatcha doin' with a bucket and a bar of soap?'

" 'Well, Tug, I'll tell ya,' he sez. 'I'm roomin' and boardin' over at Mother Reagan's house 'long with some more of the boys from the mill and there's no modern conveniences 'round the place. I jus' can't penetrate the gang 'round the wash basin in the mornin', so I supplied my own stuff. I buys me a bucket and a bar of soap and I don't have to wait so long before gettin' down to breakfast.'

"But I'll tell y' Shorty, that lad Charlie didn't stay long on the office job at the Morewood works after he learned to turn the rolls. He soon was handlin' the tongs out in the hot mill and 'fore y' know it he was hot mill foreman and then assistant super.

"They couldn't stop the lad and the next thing the fellers out in the mill knew, Charlie was leavin' to take a job with a little company down in southern Ohio. The fellers thought he was foolish to gamble his future with a strugglin' little concern—'specially 'cause he had established a reputation with the tin plate trust."

"How'd he make out?" I inquired of Tug.

"Man, dear, they couldn't hold 'im down. He became 'super' at the sheet mills and he never stopped until they moved 'im bag and baggage into the president's office—'long with his big smile."

"How's he win the confidence of the men, Tug?"

"I'll tell y', Shorty. Jus' the same way he got Ol' man Lewis to learn 'im roll turnin'. He jus' talks to the fellers in their own mill language and 'fore y' know it they're all full of 'thusiasm and rarin' to lick any problem that waits for 'em out in the plant. He asks the boys to do nothin' unreasonable; he jus' banks on 'is sincerity to get 'is story across—that's all. Didya ever know Charlie?"

"Charlie who?", I sez.

"Charles R. Hook, president and general manager of the American Rolling Mill at Middletown, O. The fellers all call him 'Charlie' to this day. I ain't seen 'im since the day he left the ol' Morewood plant—must be 38 years ago. But one of these times I'm goin' to drop in on 'im and do some chinin' like we used to do up in Gas City."

* * *

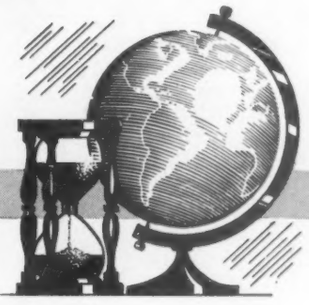
If y' ever get to Middletown, fellers, don't hesitate to stop at the main office and have the operator ring the buzzer in 'is office. Clothes don't make any difference. Fact of the matter is the more hot mill grime on your pants and shirt the more Charlie likes it. Y' see he used to be that way 'imself.

Well, I'll be seein' you.

"Shorty" Long

Experience

MUST HAVE *Two* DIMENSIONS



ENGINEERING EXPERIENCE, to be of greatest value to the iron and steel industry, must be *wide* as well as *long*. Length can be measured in *years*... but scope can only be measured by the variety of projects on which that experience was acquired.

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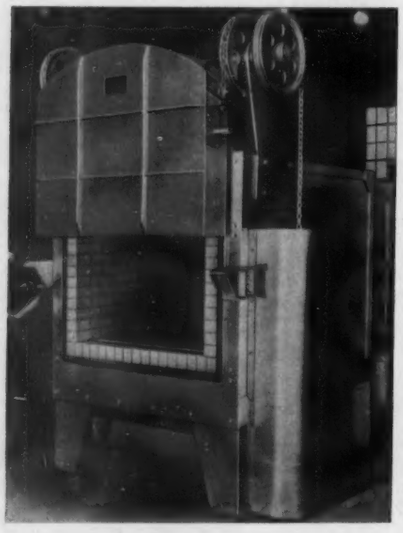
Tempering Furnaces

■ Lindberg Engineering Co., 221 North Laflin street, Chicago, has placed on the market box type furnaces for toolroom and production tempering and heating to accommodate heavy production loads such as large gears, forgings and aluminum, as well as ferrous aircraft parts. It is supplied with a standard heavy cast grid on which the work can be loaded. Sliding grids can be supplied as well as special handling means when necessary. Counterweighted vertical lift doors are used. However, air operated doors can be supplied. Doors of both types are gasketed to prevent heat loss. The unit is lined with light-weight refractory insulation. It is equipped with a fan of the pressure and blower type, built of nonoxidizing metal and supported on air-cooled, ball bearings. The drive motor is mounted on a tilting base and is connected with the fan by a Texrope drive. The

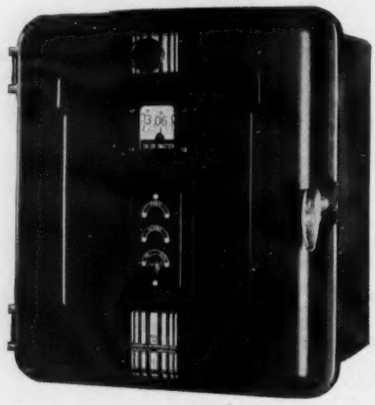


heating elements are of nickel chromium wire, formed into helical coils, except where they pass over the refractory spools as a straight wire. They are supported by an insulated plug which rests on the top of the furnace. An air switch operated by the fan, permits the elements to heat only when the fan is running at normal speed. Standard temperature ranges are 200 to 850 degrees Fahr. and 200 to 1250 degrees Fahr.

Pressure Controller

■ Leeds & Northrup Co., 4934 Stenton avenue, Philadelphia, has placed on the market a completely redesigned pressure controller for pressures of metallurgical and other industrial furnaces. It combines with a motor-driven interrupter, a relay, signal lights, and a motor-drive unit to form a complete system. The mechanism is housed in a die-cast case.

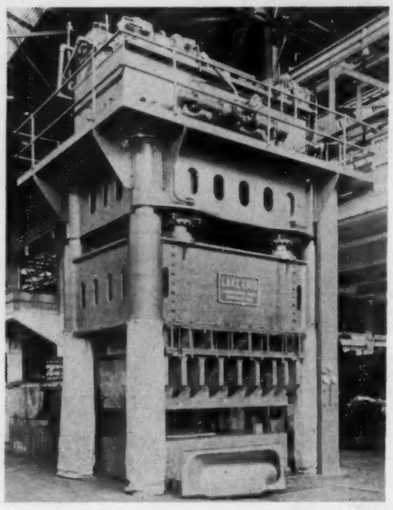
Although designed for flush-mounting, it can be supplied for surface mounting. Built into the controller door is a selector switch and a push-button station. Also located at outside of door is a handy control setting knob. Through a window,



just below it, can be seen a stationary pointer and a movable dial. Dial is calibrated from —0.05 to —0.15 inches of water. (Pressures up to 5 inches of water can be accommodated.) A turn of the control setting knob rotates the dial, and adjusts the pressure value. Adjustments are facilitated by two sets of weights. One set adjusts the zero setting of the instrument's mechanical balance; the second adjusts its sensitivity.

Hydraulic Press

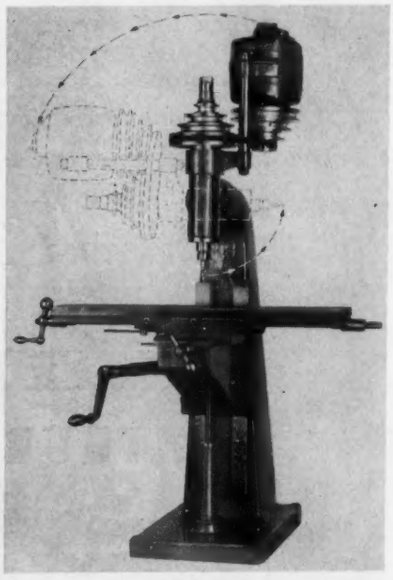
■ Lake Erie Engineering Corp., Buffalo, announces a large double-slide hydraulic press having a capacity of 1700 tons. It is capable of cold forming 5-foot bath tubs, 65 x 79 inches, in one operation from 14-gage sheets. It exerts a pressure of 900 tons on the blankholder and 800 tons on the main ram. The press has a speed of several cycles per minute. Its vertical columns are covered by flexible fabric boots to provide protection against abrasive dust resulting from dressing dies. Operation is controlled by centrally located



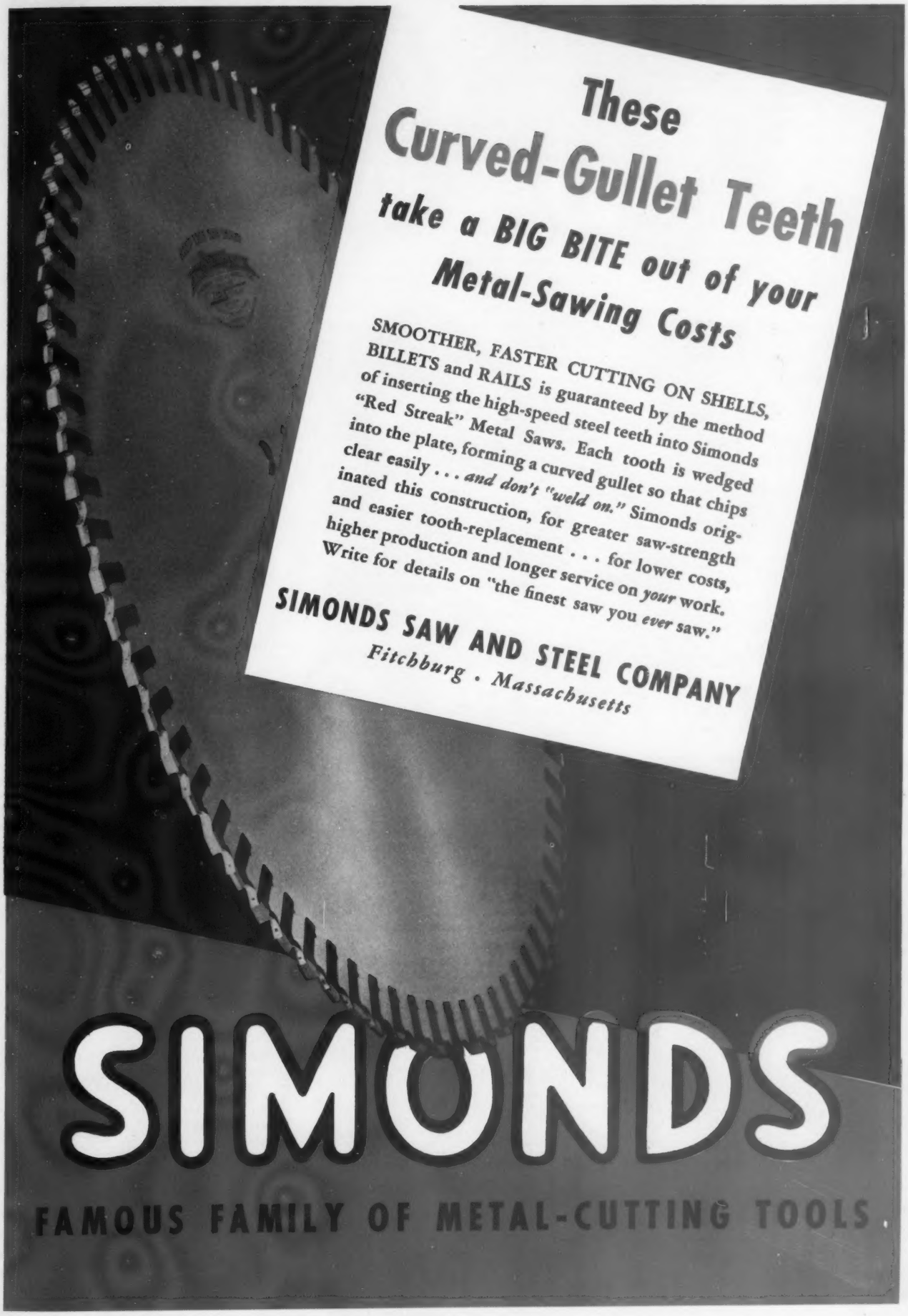
pushbuttons. Adjustable pressure control of blankholder and main ram also is provided.

Bench Milling Machine

■ J. D. Duffy & Son, 544 Insurance Exchange building, Detroit, announce a universal bench milling machine with a swivel head, graduated to a range of 90 degrees either way of the perpendicular. It can mill an 8 x 16 die at one setting and is designed for the use of cutting tools up to ⅝-inch. It also can be adapted to small grinding operations. Equipped with a base measuring 11 x 17 inches, it is powered by a heavy duty ¼-horsepower motor, and has a 4-speed V-belt pulley permitting a range of from 850 to 3400 revolutions per minute. The



swivel head spindle is 37 inches high. The maximum lift of the table to the end of the spindle is 10 inches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with a work clearance of 6½ inches from the center of the spindle to the supporting column. The table has a cross travel of 17 inches with a forward and back travel of 7 inches, movements being graduated to 0.001-inch. The spindle is equipped with a ½-inch Welden tool holder, accommodating tools from ¼ to ⅝-inch in diameter.

Filing Machine

■ Grob Bros., Grafton, Wis., have introduced a new type FA-18 filing machine for continuous filing. It has a throat of 18 inches but the same model with 30, 36-inch or larger throat is also available. The machine consists of a one-piece heavy-gage welded steel frame. The ½-horsepower motor and silent V-belt drive are built into the base. Three speeds, 80, 120 and 160 feet per minute, are provided to the files. The tiltable table is of semisteel and measures 20 x 20 inches.

The files are attached to a chain which is driven by a lower pulley having spring cushioned pins. As the file-chain is flexible, two pulleys of small diameter can be used in the upper arm as idlers which has a double advantage. Channels are mounted underneath the chain pulleys. These facilitate inserting of file-chains. To place a complete file-chain into the machine, the operator stands in front, pushes one end of the chain over the top of the upper front idler pulley and merely keeps on feeding the chain which slides in the channels over the other idler pulley and comes out at the bottom, in front of the machine. A variety of files can be furnished for this unit.

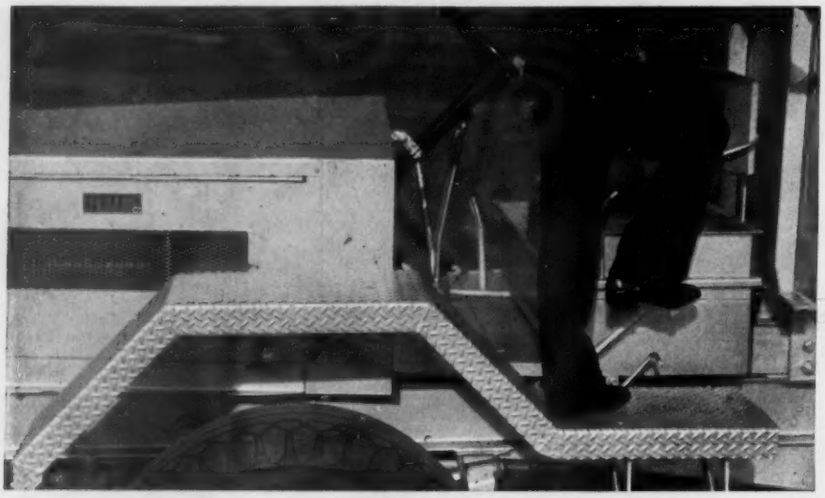
Colorimeter

■ Spencer Lens Co., Buffalo, has introduced a new direct result colorimeter which features a simplified technique in its use. It is easy to clean, light in weight and sturdy. The per cent concentraton of any colored substance is read directly on the scales. The depth of each solution is shown on a 2-part scale which reads units on the number ring and fractional parts on the drum. Each drum is fastened to its own pinion shaft and the number ring is driven by a simple gearing. Either side of the colorimeter may be used for the standard since the scales are identical.

An inclined eyepiece is embodied for comfort as is also a simple, optical system. No separate prisms are required to give the light paths their inward and forward inclination. Instead, the deviation is obtained by oblique surfaces at the upper ends of the plungers. The plungers are

inclined at a slight angle so that the lower ends enter the liquid obliquely to provide a wiping action. This action occurs automatically. The light beams from the two plungers are combined in a biprism which forms the sensitive dividing line between the two fields. When these fields are matched, the dividing line practically disappears.

The optical system is enclosed in a dustproof housing. Loading of the cups is simplified by their position at the front. These feature separable bottoms, interchangeable



Safe Footing
on Mobile Equipment

Running boards, catwalks, floors and steps on all types of moving equipment are made safer with Inland 4-Way Floor Plate.

The overlapping projections give equal resistance to slipping in all four directions. Also, they add strength by reinforcing the plate lengthwise and crosswise.

Inland 4-Way Floor Plate is made in two sizes of patterns. The light-weight, small size pattern is especially adaptable for use where dead weight must be kept to a minimum. Inland Floor Plate is readily cut, formed and welded.

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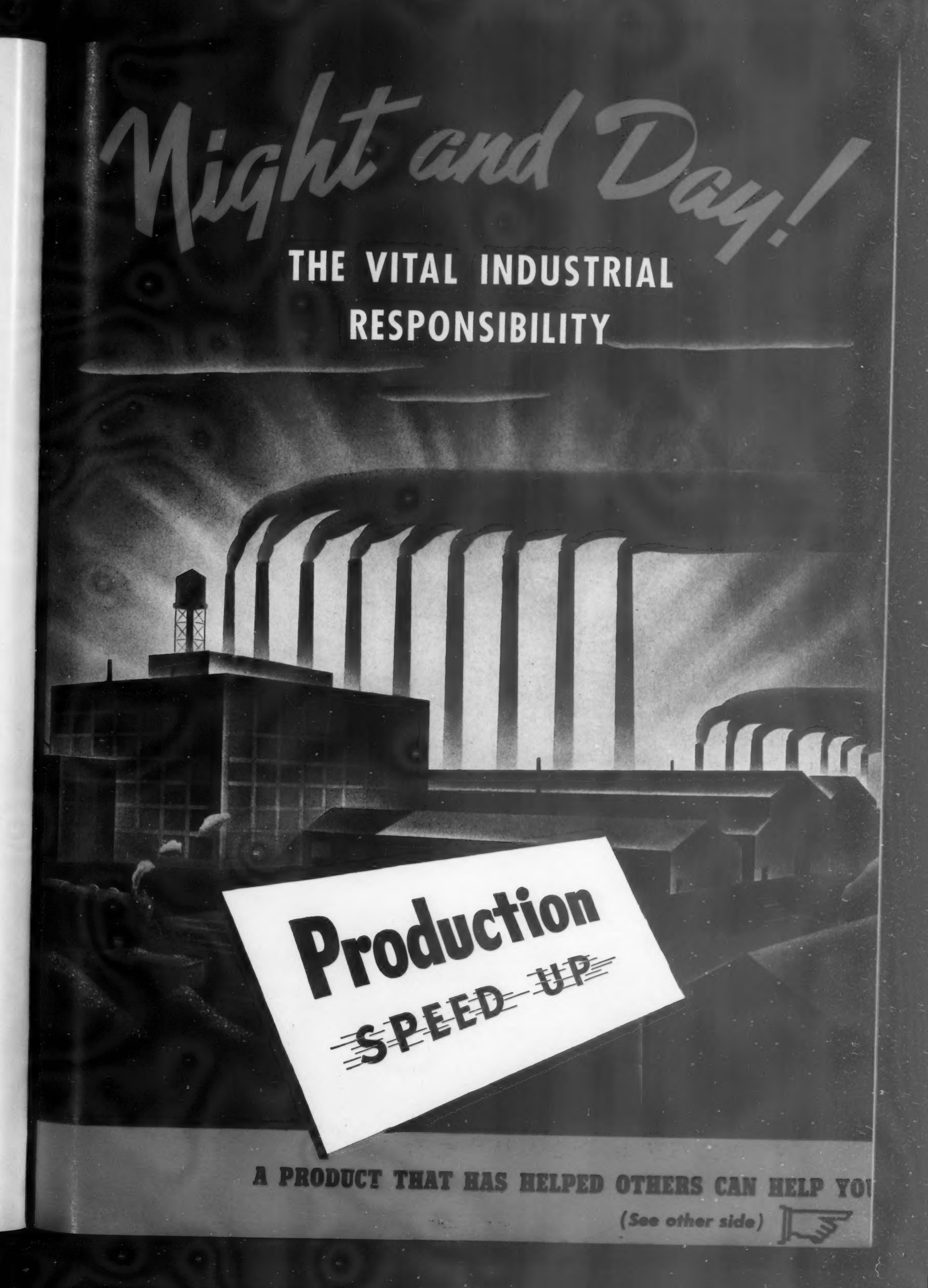
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A PRODUCT THAT HAS HELPED OTHERS CAN HELP YO
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A heavy industrial load depends on these turbines. After years of continuous operation, there has been no detectable sludge on any of these three turbines, reports the power superintendent of this New England Utility. Viscosity and acidity tests made every three months remain practically unchanged. There is no time-wasting shut-down to clean out the oil reservoir when TYCOL TURBINE OIL is used. A little make-up oil is practically the only lubrication service demanded. » » » This operator appreciates what it means to have safe and economical lubrication. Many applications like this one reflect the practical result of Tide Water's Edeleanu Process in removing sludge-forming hydro-carbons, thereby assuring greater stability and resistance to emulsification. » » » Banish waste of time, assure continuous production with the aid of Tide Water "engineered lubrication" whether it involves turbines, diesels, steam cylinder engines or any other machine. The experience and service of Tide Water engineers are at your disposal.

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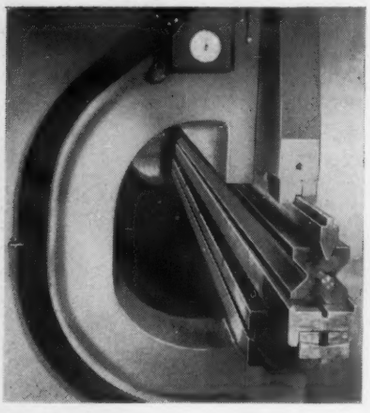
parts, and uniformity of zero adjustment. Each colorimeter cup consists of four parts; cup body with threads molded into the glass, gasket of chemically resistant synthetic rubber, glass bottom plate and threaded cap of molded plastic. The cup body has sufficient flare to prevent overflow of the liquid when the cup is filled to a depth of 50 millimeters.

Tonnage Indicator

■ Steelweld Machinery division, Cleveland Crane & Engineering Co., Wickliffe, O., announces a new tonnage indicator for Steelweld bending presses. It keeps both operator and management informed of the loadings to which the press is subjected, giving warning when the dies are worn and indicating when the press is being overburdened. The indicator has two points, the job pointer which registers the tonnage for the individual job being



worked in the press; and the maximum load pointer which indicates the maximum load at which the press has ever been operated. The former remains at the highest tonnage reading developed by any of the operations of the job. It may be reset to zero reading at any time. Once set, the indicator requires no further adjustment. A cover prevents unauthorized persons from tampering with the indicator.

Comparator-Densitometer

■ Harry W. Dietert Co., 9330 Roselawn avenue, Detroit, has introduced a new comparator-densitometer for projecting a spectrogram on a viewing screen and enabling spectral lines identification of up to 70 elements. The density of any selected spectral line may be measured by pressing a control button which starts an automatic motor scanning of the spectral line.

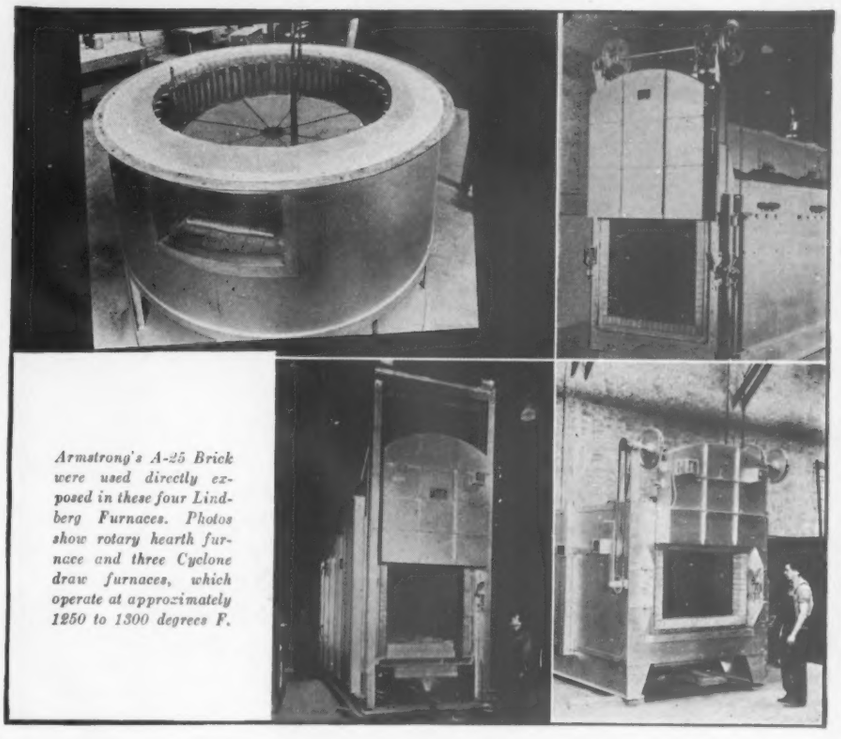
The density is read from the scale of a meter in terms of percentage of light transmission. The comparator-densitometer is housed in cast aluminum. The light source consists of a prefocus 250-watt projection lamp. The entire instrument is cooled by a motor-driven blower.

Two condensing lenses at opposite sides of the projection lamp pass the light onto 45 degree mirrors. With the mirrors in the projection system, an optical path 34 inches long is obtained which gives a magnification of 21X on the screen. The plates are held in holders arranged so a number of spring strips hold them up against machined flats.

The predominant spectral lines of some 70 elements are marked on the master plate, with respect to an iron spectrum. If desired, a wave length scale also may be placed on the master plate. The principle employed in the comparator-densitometer to measure the light transmission is to lay the slit on the emulsion side of the photographic plate and move the slit over the spectral line. The light passing through the line enters the slit and falls on a vacuum photo-cell, the output of which is amplified by a 2-stage compensating amplifier and actuates a quick reading, large scale micro-ammeter.

On the front panel of the densitometer just below the meter, are two potentiometer control knobs. The one at left is used to set the meter to read zero. The scanning

THESE 4 LINDBERG FURNACES HELP TO RE-ARM THE NATION



Armstrong's A-25 Brick were used directly exposed in these four Lindberg Furnaces. Photos show rotary hearth furnace and three Cyclone draw furnaces, which operate at approximately 1250 to 1300 degrees F.

. . . and Armstrong's Insulating Fire Brick help them operate with high efficiency

IN three leading aircraft plants and an important shipyard these furnaces, made by the Lindberg Engineering Company, Chicago, operate safely and efficiently with the help of Armstrong's A-25 Brick. A-25 is one of five types of Armstrong's Insulating Fire Brick widely used in high temperature equipment. These brick cut fuel costs, aid accurate temperature control, provide more uniform heating conditions, and effectively speed production.

Replacement costs are lower, too, when Armstrong's Brick are used, due to their greater spalling resistance, high crushing and breaking strength, and ample refractoriness. Write for facts and literature on Armstrong's complete high temperature line. Armstrong Cork Co., Building Materials Division, 985 Concord St., Lancaster, Pa.

Armstrong's

HIGH TEMPERATURE INSULATION

mechanism is mounted on a rotating table.

A control button on the front of the unit allows operator to rotate the slit to any angle desired.

Scraper Hoist

■ Ingersoll-Rand Co., Phillipsburg, N. J., announces a new scraper hoist designed especially for small scraping jobs in thin, narrow veins or stopes, irregular veins, cross cuts, for spreading wastes, for development work, etc. It has a cable pull of 650 to 1000 pounds and a cable speed of 125 to 150 feet per minute. Either air or electric drive is available.

The air motor is a Multi-Vane type with a governor which limits the free speed and conserves air. An individual clutch lever control is provided for each drum. All gears are totally enclosed and operate in a grease bath. Anti-friction bearings support all rotating parts.

Automotive Engine

■ Caterpillar Tractor Co., Peoria, Ill., has introduced a 4-cylinder model D312 60-horsepower engine. It is a 4-stroke valve-in-head water-cooled model with a bore of 4¼ inches and a stroke of 5½ inches. Maximum horsepower is developed at 1800 revolutions per minute. The water circulation is by pump, with the operating temperature of the water controlled by thermostat.

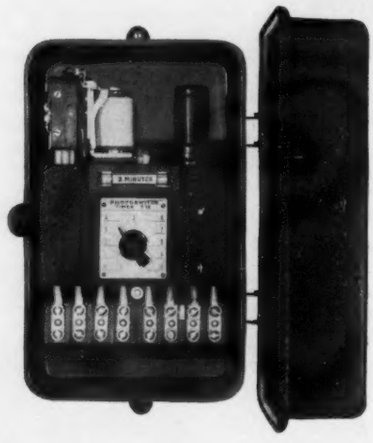
Pressure lubrication is provided to all main and crank pin bearings, camshaft bearings, valve operating mechanism and timing gears. The fuel system features solid injection into precombustion chambers. There is an individual pump and valve for each cylinder and the system is factory set.

Gage Blocks

■ George Scherr Co. Inc., 128 Lafayette street, New York, announces a Mechanic's Own set designed for the toolmaker's tool box. It consists of five gage blocks accurate to 8 millionths of an inch, in the following dimensions: 1, 0.500, 0.250, 0.125 and 0.0625-inch. The set enables the mechanic to produce a given tool, fixture, jig, gage or work piece with assurance that the result will be correct to specified limits.

Interval Timer

■ Photoswitch Inc., Cambridge, Mass., has introduced a T15 short interval timer which is accurate over ranges from 1/20 of a second to two minutes. Control is accomplished through a snap-action relay of 1000 watts capacity. The unit is flexible

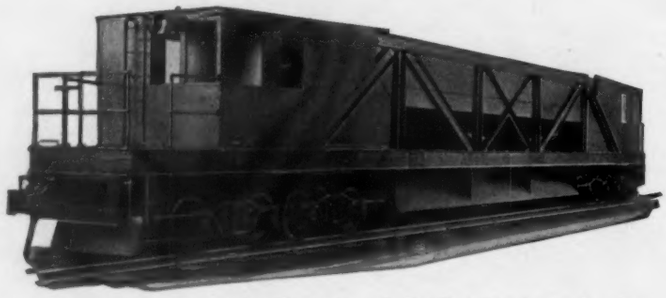


with reference to actuating control, permitting both momentary push button and sustaining contacts control. It is universal for six timing ranges represented by timing valves snapped into a readily accessible clip.

Long-Horn Spot Welder

■ Eisler Engineering Co., Newark, N. J., has placed on the market a No. 250-AA long-horn spot welder for deep sheet metal work. Its feature is that both upper and lower horns can be lengthened or short-

ATLAS ORE TRANSFERS



100 ton—3 compartment Ore Transfer. Roller Bearing Journals. Double end control for car operation. Individually operated discharge gates.

OTHER ATLAS PRODUCTS

Gas-Electric and Diesel-Electric Locomotives . . . Electric Transfer Cars for Blast Furnaces and Steel Plants . . . Stockhouse Scale Cars for Blast Furnaces . . . Concentrate and Calcine Cars for Copper Refineries . . . Automatic and Remote Controlled Electric Cars . . . Pushers, Levellers and Door Extractors . . . Coal Charging Lorries, Coke Guides and Clay Carriers . . . Atlas Patented Coke Quenching Cars for By-Product Coke Ovens . . . Atlas Patented Indicating and Recording Scales . . . Special Cars and Electrically Operated Cars for every conceivable Purpose.

THE ATLAS CAR & MFG. CO.

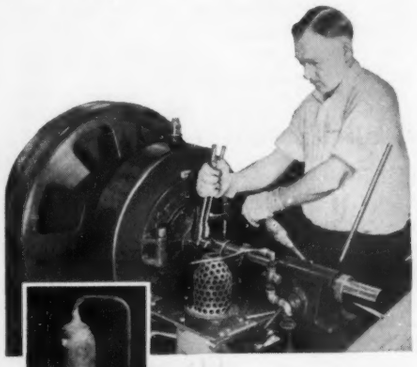
Engineers . . . Manufacturers

CLEVELAND, OHIO

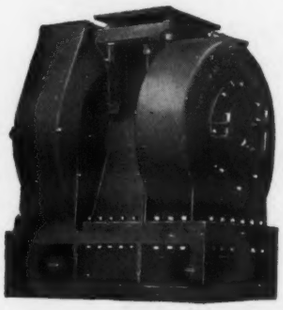
ETNA SWAGING MACHINES

The *Modern Way* of tapering, sizing or reducing round solids or tubing

This is the #406 ETNA used in pointing tubes. The No. 400 series of ETNA Machines are built for big work—have a maximum capacity of 4" on tubing and will take dies from 6" to 18" long.



This is the #103 ETNA used in swaging a 1⅛" x .050" wall copper tubing with ends closed in hemispherical shape to 3/16" diameter hole—at the rate of 900 pieces per 8-hour shift.



Hot or cold work can be handled on ETNA Machines without additions or changes and the larger sizes have ample storage capacity in the sturdy base for circulating fluids.

ETNA HAS THE ANSWER

The Country's Leading and Most Efficient Plants Are Using ETNA SWAGING MACHINES

FOR FASTER PRODUCTION

A Detroit carburetor plant recently stepped up production 55% on a sizing operation with a #32 ETNA. A leading refrigerator manufacturer is setting new record standards in swaging copper tube with a #103 ETNA.

FOR REDUCING COSTS

Hundreds of plants, where sizing, tapering or reducing round solids or tubing is on a production basis, have saved thousands and thousands of dollars by calling on ETNA's specialized experience in this type of work.

FOR BETTER WORK

For example, one of the largest tube makers used to point tubes for draw bench by hammering—with the result that ends of tube were smashed, scale trapped and die life impaired because of tube scoring in drawing. With a #406 ETNA they now point tubes evenly, leaving a hollow point so pickling fluid can quickly get into the entire length of tube providing a better finish and better work on the draw benches. Result—Work is done more rapidly—rejections are at an absolute minimum.

FOR IMPROVED FINISH

ETNA SWAGING MACHINES are precision built to do precision work. They eliminate old fashioned swaging operations and give better finished work—reducing machinery, even sometimes eliminating it.

Write for free booklet

Take advantage of the experiences of the country's leading plants.—See how they solved manufacturing problems with ETNA MACHINES. Booklet contains many case studies.

• **SIZES AND CONSTRUCTION**—ETNA SWAGING MACHINES are built in capacities of ⅜" to 4" diameters with die lengths of 1" to 18". Larger sizes built to order. ETNA Machines are safety proof—employing the finest selected alloy steels, careful heat treating and forgings in all parts involving wear or strain.

THE ETNA MACHINE CO.

3400 Maplewood Avenue • Toledo, Ohio

ened to meet the requirements of the size and type of work. This adjustment makes it possible to weld light and heavy work and deep metal parts.

The units are available with different styles of electrodes, and in this case, the cooling water goes through the entire horn.

Limit Switch

■ General Electric Co., Schenectady, N. Y., has developed a small geared limit switch for use on motor-driven devices where it is necessary to limit the rotation of the motor shaft or some rotating shaft or gear on the driven machine. Its dimensions are 4 11/16 x 3½ x 1 29/32 inches. In operation, the shaft of the switch serves as a driving gear, causing the pinion shaft to turn. The pinion shaft engages the driving gears which move along the drive screw toward one of the operating gears at either end.

At the end of travel in either direction, a pin on the traveling gear engages a pin on the operating gear. This causes the operating gear, cam and safety pin, which are a unit, to rotate and move the switch contact arm to a high part of the cam, operating the contacts. The contacts are designed for 125-volt 4-ampere alternating current operation and 125-volt 1-ampere direct current operation.

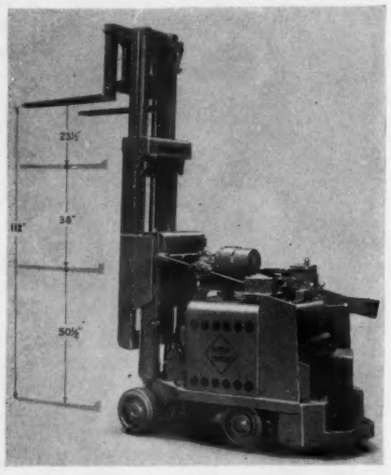
Other features include double-break fine-silver contacts, a mechanism easily adjusted to operate contacts between a minimum of ⅛ turn of the driving shaft to a maximum of 120 turns, and three holes in the base by which the switch may be mounted in any position.

Combination Agitator And Circulating Pump

■ Binks Mfg. Co., 3114 Carroll avenue, Chicago, has introduced a new No. 460 series combination agitator and circulating pump unit for use in spray finishing work. It is adaptable to all Binks TU type tanks and is ideal for multiple spray gun operation and for short pipe runs. The unit can be mounted on the tank or above the tank and driven by a flexible shaft. Air or electric motors furnish the driving power.

Fork Truck

■ Elwell-Parker Electric Co., 4205 St. Clair avenue, Cleveland, announces a new ERS-3T fork truck capable of elevating loads on skids or pallets to three levels instead of one. Its elevating mechanism is built in three telescoping sections. When uprights are completely lowered, the forks just clear the floor. Forks can be raised to 50½ inches on the first lift, to 88½ inches and 112 inches on the second and third respectively. The rate of upward travel is 20 feet per minute with a 1500-pound load. The overall height of the truck is 74 inches with telescoping members lowered. The main driving motor is a 4-pole, series wound unit capable of sustaining a 500 per cent overload. Power source can be derived from either acid or alkaline batteries. Hoist is operated by a separate motor controlled by



AMERICAN *Full-Roller* BEARING

Here's a bearing that dares you to put it to the severest test you can think of, in the most exacting bearing application you have in your plant. Like other American Heavy-Duty Bearings, the Full-Roller type has never been found wanting when super bearing performance is required. Pioneered by American, and *proved* in countless installations, this bearing will "fill the bill" in your next full-roller application. Our specialized engineering experience is at your service.

Write today for full technical facts.

AMERICAN ROLLER BEARING COMPANY, PITTSBURGH, PA.

Pacific Coast Office: 321 W. Pico St., Los Angeles

AMERICAN
Heavy-Duty ROLLER BEARINGS

push-button. It may be tilted 15 degrees backward or 5 degrees forward from vertical. Vertical uprights and tilt gearing are designed to prevent sidesway. The hoist is provided with ratchet device which operates when the descending load meets an obstruction. A slip clutch serves the same purpose when ascending loads are obstructed. A solenoid brake locks the hoist load in any position. Drive wheels are 15 inches in diameter and 5 inches wide. Trail wheels are the same diameter but only 3½ inches wide.

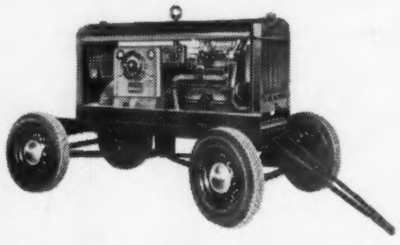
Side-Break Switch

■ Delta-Star Electric Co., 2400 Fulton street, Chicago, has introduced a high pressure PMB-236 contact side-break switch which features multifinger high pressure, button contacts formed to guide the jointed ice and corrosion breaking contact member at the end of the tubular blade.

When closed, the duronze arcing horns are separated but as the switch is opened, they make spring-pressure contact before main contacts break and remain in contact for a part of the opening movement. Arc occurs on the horns, not between blade and stationary contacts. The switch is made in all standard voltage ratings from 7.5 to 115 kilovolts, and ampere ratings from 400 to 1200 amperes.

Arc Welder

■ Hobart Bros. Co., Troy, O., have introduced a heavy-duty gasoline-engine portable arc welder. Its portable mounting and trailing hitch facilitates and quickens its maneuver-



ability over smooth highways or rough terrain. Six and 8-cylinder counter-balanced industrial motors are available for each welder. Remote control also is supplied on this outfit at no extra cost.

Hydraulic Presses

■ Colonial Broach Co., 147 Jos. Campau street, Detroit, has introduced a Senior line of general purpose hydraulic presses for such operations as assembling and broaching. The presses range in capacity from 1 to 10 tons, with strokes ranging from 18 to 42 inches. With motor located within the column, they require minimum floor space. Open side fixed table construction permits working on long parts which would extend beyond the machine table — as in straightening or assembly.

An exceptional amount of "daylight" is provided to allow for large fixtures, without sacrificing stroke. Work platen is removable for machining of special clearance holes as required. Rugged reinforced construction is used for the frame, the cylinder bearing being placed in the neck of the frame. The cylinder is of leak-proof steel tube construction and an integrally welded flange transfers working thrust directly from the working cylinder to the frame. Standard hydraulic pumps and equipment are used.

Pumps are of large capacity, direct motor driven. Large oil tanks insure cool oil in the hydraulic system. Coolant flow where required is provided by an oversize centrifugal pump which is mounted on the base of the machine. This is driven by a separate motor. Chips can be removed while the machine is in operation—without disturbing the operator—through troughs located in the side of the column. The presses can be furnished with controls to

Announcing

A REVOLUTIONARY ACHIEVEMENT

AMCO

Cold-End-Fired

CONTINUOUS HEATING FURNACE

. . . The greatest advance in slab and billet heating practice in a generation!

•

Greatly increased production.

More Uniform Heating.

Eliminates Washing.

Permits use of high air pre-heat temperatures without alloy hot fans.

AMCO PIT FURNACES
ANNEALING FURNACES
ROTARY HEARTH FURNACES
FORGING FURNACES
PULVERIZED COAL SYSTEMS

The AMSLER-MORTON COMPANY
FULTON BUILDING • PITTSBURGH, PA.

stop operations at top or bottom of piston stroke, or with an automatic return after the piston has completed its downward travel. A special hydraulic circuit is available which permits the use of shuttle type fixtures.

Test Stand

■ U. S. Electrical Motors Inc., 200 East Slauson avenue, Los Angeles, has developed a new Aero test stand for testing aircraft generators, vacuum pumps, hydraulic pumps and alternators. It was developed to determine whether the generator will carry its rated load through normal operating speeds and also to determine whether the clutch will remain engaged throughout the normal engine operating speeds — and that it will disengage at a predetermined speed. The accessory to be tested is rigidly aligned by locking it in place on the mounting bracket. The stand provides positive speed changing means capable of covering the full range of testing speeds. A handwheel is operated to adjust the motor speed to the exact revolutions per minute desired.

The speed changes are accomplished by varying the diameter of the varidisks or sheaves. Two varidisks reciprocally expand and contract for higher or lower speeds, transmitting power through the belt to the take off shaft. The speed of the motor is constant while the speed of the take off shaft is adjustable to any revolution per minute desired. A magneto generator and calibrated speed indicator show the output revolution per minute of the test stand.

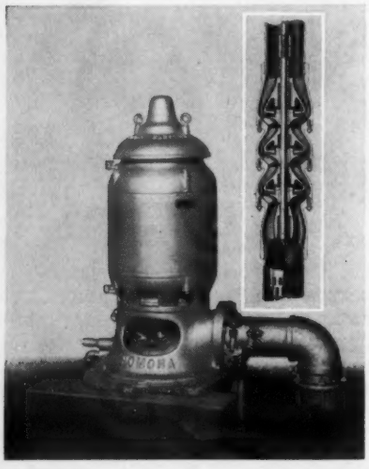
Portable Welder

■ Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has placed on the market a new model portable alternating current Flex-Arc welder for general utility service and production welding of every type. It operates on either 200 or 440 volts and is self-contained. It provides 20 to 250 amperes of welding current in 27 current steps. Current adjustment is made by inserting bayonet plugs in the proper receptacles, the current values being indicated in large numerals.

A built-in "De-Ion" breaker insures protection against sustained overloads. The welder is enclosed in a steel case mounted on three wheels. It is furnished complete with all accessories, including welding helmet with lens, electrode holder, all leads, and a 17-pound assortment of electrodes.

Vertical Turbine Pumps

■ Pomona Pump Co., Pomona, Calif., announces improved 6-inch medium capacity vertical turbine pumps, the efficiency of which have been increased 6½ points, and the



number of stages have been reduced one-fourth. Besides using a lower horsepower motor (7½ horsepower), the units are water-lubricated. The semiopen impellers can be adjusted from the surface for wear and for changing capacity — they are nonsandlocking and nongaslocking. Constructed of bronze, they operate in a cone-shaped seat in the pump bowls.

SEE FOREST CITY
For Alloyed Semi-Steel Castings
FIFTY YEARS of casting production has given Forest City an infinite variety of experience in producing gray iron, semi-steel and alloy semi-steel castings for all types of industries. These industries include:
Automotive
Pressure Pump
Office Equipment
Electrical and Household Appliances
Building Equipment
Machine Tools and Equipment
An example of an intricate, alloyed semi-steel close grain casting produced by Forest City is pictured above.
Whatever your requirements in castings weighing up to 500 pounds each, Forest City's two efficient modern foundries are prepared to produce. Our representative will gladly show you why.
THE FOREST CITY FOUNDRIES COMPANY
2500 WEST 27TH STREET
CLEVELAND, OHIO
Our latch string will be out at
BOOTH Y-4
NATIONAL METAL CONGRESS
AND EXPOSITION
You are cordially invited to pay us a visit
THE FOREST CITY FOUNDRIES CO.

Introduces Fire, Acid Resistant Floor Dye

■ An improved floor dye called Colorflex is announced by Flexrock Co., S dept., 2300 Manning street, Philadelphia. It is enamel-like in appearance and makes floors fire and acid resistant. The dye is available in four colors—linoleum brown, tile red, emerald green and battleship gray.

New Air Filter To Replace Regular Designs

■ The new American automatic air filter which went into regular production on Oct. 1, will replace the present Multi-Panel and Double-Duty constructions, according to American Air Filter Co. Inc., First and Central avenue, Louisville, Ky. A new casing has been designed so that either armored screen panels or die-stamped louvre panels can be used for the filter curtain. Thus the filter will have the same performance characteristics as the present equipment.

In makng this change to simplify the line of automatic filters, the section heights and widths selected for the Electro-Matic filter were standardized. The designation numbers for height and width are now the same for all curtain type self-cleaning filters. The overall dimensions of the American automatic, however, are different from those of either the Multi-Panel or Double-Duty.

American Industry Large User of Alloy Coatings

■ Electroplated alloy coatings in a variety of colors and "tailor-made" for many applications are in large daily production in American industry, therefore can no longer be termed laboratory curiosities. So stated Dr. Charles L. Faust, research engineer, Battelle Memorial institute, Columbus, O., who addressed the seventy-eighth general meeting of the Electrochemical Society, meeting in Ottawa, Canada, Oct. 2-5.

Alloy deposition is considered as any process where two or more metals are deposited simultaneously and in which, due to this co-deposition special properties are imparted to the electroplate. In general, alloy deposits are denser, harder and brighter than plates of single metals, Dr. Faust pointed out. There are certain composition ranges where alloy deposits have been found more corrosion resistant, more adherent to the base metal, more readily buffed, more suitable for subsequent plates, more readily deposited over a wider range of operating conditions than one or both of the individual metals.

An excellent example of adapting alloy deposition to an engineering problem is found in the use of brass plating to insure rubber adhesion to steel. Most of the fast curing, commercial rubber stock will adhere to so-called alpha-brass but in general not to other metals and alloys. The process has been in operation for a number of years in the rubber industry for making rubber-lined steel acid tanks and other rubber coated metal products.

Many of the bearing alloys used in the automotive industries are electroplated on strong steel backs. These include such combinations as cadmium-silver and silver-lead. According to Dr. Faust, the silver-lead bearing alloy, a development of the Battelle laboratories, is especially suited for aircraft engine use and probably will see wide use in that field.

The science of alloy deposition has been studied completely enough to offer a good start to anyone desiring to produce an alloy plate of copper-zinc, nickel-cobalt, nickel-iron, cadmium-zinc, karat gold, cadmium-silver, copper-tin, and silver-lead.

The super-stamina of Yellow Strand is common knowledge in steel mills and foundries. *Now*, we're braiding this invincible wire rope into slings—the last word in flexibility, kink resistance, safety, durability.

Yellow Strand Wire Rope Plaited Safety Slings* are "soft"—handle highly finished steel rolls without damage. They hold irregular loads snugly, handle heaviest castings safely.

Many types and constructions and a wide range of fittings are available; or our engineers will design a Yellow Strand Plaited Safety Sling for your exact requirements.

FREE Riggers' Hand Book

New edition contains full data on Plaited Safety Slings, standard Yellow Strand Slings, fittings, etc. No charge, of course.

Broderick & Bascom Rope Co., St. Louis

Branches: New York, Chicago, Seattle, Portland, Houston

Y-3

Yellow Strand Plaited Safety Slings

*Murray Patents: U. S. Patents 1475859, 1524671. Canadian Patents 252874, 258068.

Welded Dies

(*Continued from Page* 108)

temperature of each section was different at the time the heat source was removed. The weld metal received the most drastic cooling and should be the hardest. The metal just at the transition and that portion just into the parent metal had successively lower cooling rates and therefore did not show hardness to so great an extent.

Similarly there is a difference in grain structure. The weld, due to a high degree of superheating, should show the coarse structure of a cast metal. The parent metal just at the junction should also be coarse because its temperature has approached the melting point. At the point where the transformation has just taken place, there should be a refinement because of the change in crystal structure just above the critical temperature.

In Fig. 3 it may be seen that the breadth of the affected zone gives an indication as to which process is most localized in its heat affects. Arc welding is most localized, followed by atomic hydrogen welding, while the gas weld affects a goodly portion of the parent metal. It may be concluded that gas welding produces the most dilution of the rod with the base metal, with atomic hydrogen welding and arc welding in successive order.

Weld hardness is another factor. In metallic arc welding, the weld is the hardest portion. In gas welding, however, there seems to be a little drop in hardness which may have been due to using a non-reducing flame. Atomic hydrogen weld, however, shows a decided decrease in hardness due to the loss of about 33 1/3 per cent of the carbon of the welding rod in the process.

Hardness curves for the hardened pieces show that the arc weld is practically the same as the base metal. The atomic-hydrogen weld with its decreasing carbon content falls substantially below the hardness of the parent metal. The oxy-acetylene weld seems to have fallen out of proportion and may have been the effect of a poor weld.

To substantiate the values obtained in hardness, micrographs were taken to show what had happened in each case. Structure of the original water-hardening rod in the annealed condition is spheroidized. "As welded" micrograph studies show the atomic-hydrogen weld has a fairly good sorbitic structure.

The oxyacetylene weld shows quite large grains somewhat equiaxed, probably due to the thickness of the deposit which tends to anneal itself during the welding process. The base metal is spheroidized in comparatively large particles.

Micrograph studies of the welds heat treated show quite different structures. The atomic-hydrogen weld seems to become poorer in structure. Again this variation may be accounted for because of the non-homogeneity of that type of weld. The gas weld shows a decided refinement of grains but not enough to make it comparable to the base metal. The arc weld, however, substantiating the hardness readings, compares quite closely to the base metal.

(*Continued next week*)

•

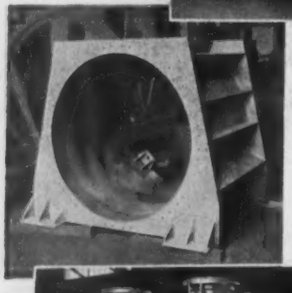
Life of Valve Seats and Disks Increased

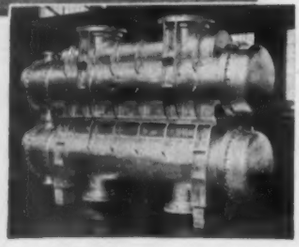
■ Through the use of a new development, Superfinishing, the life of valve seats and disks is increased twelvefold in the 500 brinell valves made by Hancock Valve division, Manning, Maxwell & Moore Inc., Bridgeport, Conn. The development produces a highly polished wearing surface by "honing" which eliminates almost the last trace of friction. Special Superfinish machines are being used to apply the development. Equipping the valves with Superfinished seats and disks, however has not increased prices.

YOUR HORIZONTAL FILLETS WILL COST LESS MADE WITH FILLEX

Dust collectors Murex-welded by American Blower Co., Detroit, involve many Fillex applications.

Fillex speeds fillet welding like that in this air test assembly, Murex-welded by The Graves-Marshall Co., Dayton, Ohio.





Fillets in these Murex-welded petroleum condensers, built by Ross Heater Co., Buffalo, are typical of Fillex welds.

THE HEAVY COATED "HOT ROD" THAT PROVIDES CLEANER WELDS AT HIGHER CURRENTS

Specially designed for high speed horizontal fillet welding, Murex Fillex Electrodes help reduce welding costs.

Even at high amperages, Fillex Electrodes produce sound, evenly proportioned fillets without undercutting and with a minimum of spatter. Slag is easily removed, resulting in real savings in time on multi-pass work. Weld surfaces are smooth and welds require little or no cleaning.

Write and ask to have Fillex demonstrated on your horizontal fillet welding applications.

METAL & THERMIT CORPORATION
120 BROADWAY, NEW YORK, N. Y.
Albany • Chicago • Cincinnati • Detroit
Minneapolis • So. San Francisco • Toronto
"Murex Electrodes—Thermit Welding—Thermit Metals & Alloys."

Investigate Thermit Welding, too—in use since 1902 for heavy repair work, crankshafts, housings, frames, etc.

MUREX HEAVY COATED Electrodes
A COMPLETE LINE FOR EVERY WELDING APPLICATION

Many Uses Covered By Low-priced Tools

■ Manufactured on a mass production basis, the new line of cemented-carbide tipped standard cutting tools introduced by Carboloy Co. Inc., P. O. Box 239 R. Pk. A., Detroit, is being priced so low that the tools are likely to decrease the amount of brazing and grinding now done by organizations who at present purchase the tips to produce their own tools.

In addition to covering, in five standard styles and three grades, many turning, boring and facing applications in industry, the new standard tools are also capable of simple conversion, by the purchaser, into many forms of "special" tools.

Introduction of a standard line of tools for machining of steel has been facilitated through the development of a general-purpose grade of Carboloy for steel cutting. Tools made of this grade (78B) will stand more abuse than those of the 78 grade, while they also have greater resistance to abrasion than the 78A grade. They are designed to take cuts up to ½-inch deep, and feeds up to 0.030-inch. For machining of cast iron, the standard tools are available in two optional grades.

Ready differentiation between tools designed for steel cutting and those intended for machining of cast iron is provided by coloring of the shanks of the tools. Those for steel are copper colored, those for cast iron are finished in "aluminum", avoiding use of wrong grades of tools through handling errors in the user's plant.

Following are prices of the new line, all styles in each size being priced identically, except style No. 1. Prices for the latter vary slightly from those listed below:

Shank Size	1	Price In Lots of 2 to 4	50 or over
5/16 x 5/16	1.55	1.30	.85
⅜ x ⅜	1.85	1.50	.90
½ x ½	2.65	2.15	1.50
⅝ x ⅝	3.95	3.20	2.40
¾ x ¾	5.35	4.25	3.10
1 x 1	9.55	7.60	5.95
1¼ x 1¼	15.50	12.20	9.90
⅝ x 1¼	9.45	7.60	6.05
¾ x 1½	12.20	9.75	7.65

All styles and sizes will be stocked for immediate delivery. They are finish ground, ready for use, including even a grinding-in of a chip-breaker on tools designed for steel cutting.

Extension to Building Facilitates Pouring

■ An open-hearth building extension completed recently by Central Iron & Steel Co., Harrisburg, Pa., will facilitate the pouring of ingots and relieve a crowded condition which previously interfered with simultaneous operation of a majority of the plant's six basic open-hearth furnaces.

The extension, 60 feet wide and 74 feet high, is 160 feet long and enlarges the open-hearth pit building to 820 feet in length. This addition includes a pouring pit section, 120 feet long, and a 40-foot section devoted to the breaking up of pit scrap and ladle skulls.

The new extension to the open-hearth pit building is used principally for casting small ingots, these ingots being used mostly for the production of universal plates. The extension also contains a sunken pouring pit in which hot top ingot molds can be preheated for the teeming of quality steels.

A skull cracker is operated at the end of the extension, with a heavy steel plate wall partitioning this section from the pouring pit area. Scrap metal is carried to the skull cracker by the overhead pit cranes, broken up and then deposited in charging boxes for return to the charging floor.

The company operates one 126-inch and one 89-inch sheared plate mill and one 42-inch universal plate

Our Laboratory
. . . HELPS YOU SOLVE
YOUR SOLDERING PROBLEMS

In this age of alloys, soldering is a science . . . a science contributed to by the Kester Solder Company and made available to solder users in all industrial fields.

When you put a soldering problem up to Kester, here are the material resources available to solve it:

100 different solder alloys
10 different solder fluxes
80 different solder strand sizes
4 different solder core sizes

You can see at a glance that the number of possible combinations is almost endless. Kester engineers will aid in the selection of the right alloy, the right flux, the right strand and core size to do your work with the greatest possible speed and economy.

You may be sure that soldering problems in your business will come within the scope of Kester's experience or ability to solve. Kester plants are the largest and best equipped in the entire industry, and 43 years of specialization in solder manufacture have produced the one quality line that meets every soldering requirement.

Kester Is At Your Service

KESTER SOLDER COMPANY
4222 Wrightwood Ave., Chicago, Illinois
Eastern Plant: Newark, N. J. Canadian Plant: Brantford, Ont.

KESTER
CORED SOLDERS
STANDARD FOR INDUSTRY

mill, with a total annual capacity of about 250,000 net tons of rolled products. It also operates a flanging and fabrication department as well as a stamping and pressing department. Capacity of the 126-inch mill was stepped up recently by various improvements in rolling processes, including a saving in time required for roll changes.

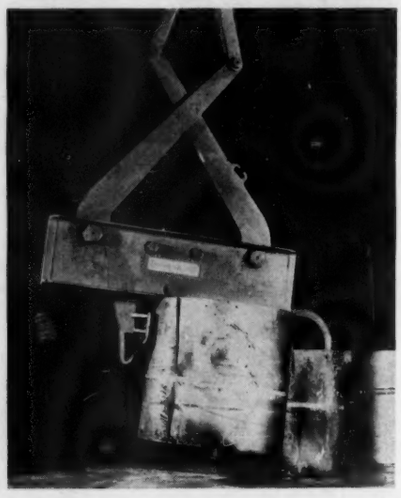
Tongs Provide Speed And Safety in Handling

■ In plants where materials have to be handled by cranes or hoists, the use of Gellert tongs, now produced by Heppenstall Co., Forty-seventh and Hatfield streets, Pittsburgh, is said to decrease hazards to life and limb, and lost time.

All that is required with the tongs is to lower them on to the work, and the tongs do their job automatically. The craneman has entire control, and ground men do not have to throw chains around hot ingots or forgings, nor climb to the top of scrap piles.

Several types of these tongs are in successful operation in steel mills and foundries for handling ingots, ingot molds, die blocks, pipe, and wire—other special designs are made for nonferrous metal ingots or shapes, paper bales, sacks of sugar and similar materials. Lifting capacities run as high as 200,000 pounds.

To assure freedom from failure, the working parts of the tongs are of a nickel-chromium-molybdenum steel corresponding to SAE 4340, heat treated.



Gellert tongs in action. Movement of the equipment is controlled entirely by the craneman from his cab

THIS dial says "When" *automatically!* It has photo-electric control and weighs accurately (and rapidly) batch ingredients of varying kinds and quantities.

Perhaps you don't do batching or proportioning. Even so, the *basic principle* of this versatile control device may help you solve some other weighing or force measuring problem. Remember, it is accurate, rapid and automatic. It saves time and cuts costs.

And it's Toledo-built; more evidence of Toledo's superior engineering knowledge and versatility. It is another of the "45,000 Ways to Weigh"—and that's the title of a new illustrated brochure that you will find interesting, helpful, and time-saving. Send for it.

TOLEDO SCALE COMPANY, Industrial Scale Division, TOLEDO, OHIO

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Metallurgical Practice In Second Edition

■ *An Outline of Metallurgical Practice*, by Karle R. Hayward; cloth, 690 pages, 6 x 9 inches; published by D. Van Nostrand Co. Inc., 250 Fourth avenue, New York, $7.50.

This volume, the second edition of a book first published in 1929, has been revised to a considerable extent to include such new processes and improvement of older processes as have developed during the intervening period. As the title of the book indicates, it is a general treatise designed as a quick reference book for engineers, and students of metallurgical courses without practical experience and little knowledge of the subject or its literature.

It is divided into 25 chapters which discuss practically all of the common, commercial and rare metals. Information is given on winning the metal from the ore, physical and mechanical properties, alloying properties and chemical behavior. Metals discussed include copper, lead, zinc, aluminum, nickel, tin, mercury, antimony, arsenic, bismuth, cadmium, cobalt, magnesium, beryllium, gold, silver, platinum, chromium, tungsten, manganese, vanadium, molybdenum, zirconium, iron and steel and nonferrous alloys.

New Custom Alloy Shop

(*Concluded from Page* 112)

of bad weather. He organized the Youngstown Alloy Casting Corp., rented a section of the abandoned foundry of the Banner Furnace Co. and bought a small electric furnace. The unit had a capacity of about 500 pounds per melt but with a plentiful supply of fire clay and bricks, Trantin built up the roof of the little furnace until it had a capacity of 1000 pounds. Many steel men who saw the furnace insisted it wouldn't work, that its roof would fall and cause a bad accident, but it worked perfectly for five years, turning out hundreds of tons of high-grade alloy steels.

Recently the company bought a Lectromelt electric furnace, which has a capacity of about 1000 pounds, keeping the initial electric furnace as a stand-by unit.

Today, the plant makes alloy steel castings of all descriptions for special jobs with an accuracy of 0.005-inch, making it possible to eliminate much expensive machine work. For example, on one electric weld pipe mill casting machine work amounting to $26 is saved. Other types of castings are made which resist heat, corrosion, wear or acids.

At present, Youngstown is dickering for an $8,400,000 aircraft engine research laboratory to be built by the national advisory council for aeronautics from funds appropriated recently by congress. Youngstown hopes to locate the laboratory at the new $2,500,000 municipal airport, and is using Trantin's plant as a "talking point" in trying to get the laboratory, since the laboratory will have need for a great many special alloy steel castings of unusual design in its experiments with aircraft engines.

♦

Age Hardening

Part III

■ *Additional references for the Bibliography which accompanied Part II of Paul J. McKimm's article in last week's issue on "Age Hardening of Cold Reduced Strip", follow:*

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ARMCO ZINCGRIP takes this severe stamping job in stride. There's no flaking or peeling of the zinc on these door slats for grain bins.

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GIVE FULL PROTECTION

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Paint Stick Marks Hot or Cold Surfaces

■ A solidified paint stick called Markal A, suitable for marking either hot or cold surfaces is announced by Markal Co., 6 East Lake street, Chicago. It is especially adapted for marking cold metal parts that require an annealing treatment at temperatures up to 1400 to 1600 degrees Fahr.

The metal part can be immersed in oil or water immediately after passing through the annealing furnace without impairing the legibility of the marks. The paint stick is ideal for plate mills as well as "stickers" at the open hearth where great variation in temperature is encountered. It does not flow, run, char or discolor in marking hot surfaces. The markings also will withstand all weather conditions and will not chip, peel or crack after the surface is cooled off.

Sticks ranging from 180 to 1500 degrees are available in white, green, yellow, blue and black colors. Those for higher temperatures are available in white only.

Manufacturers of New England Are Listed

■ *Directory of New England Manufacturers*, 764 pages; published by George D. Hall Inc., 30 Kilby street, Boston, at $20.

This is the sixth edition, published with editorial co-operation of the New England council, brought up to date, including 17,700 changes from the 1940 edition.

It covers all New England, listing all manufacturers, regardless of size. It classifies all manufactured products and tells who makes them, gives size and personnel of all companies and locates source of supply geographically as well as by products. Listings are by type of product, trade mark or brand name, geographically and alphabetically.

Revisions include 450 firms that have gone out of business, 1100 new listings added, 7700 changes in personnel, 1700 products added or eliminated and 4050 other important changes.

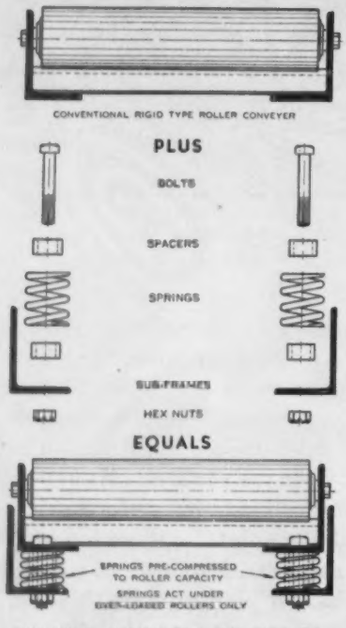
Arc Welding Lessons

■ *Practical Lessons in Arc Welding;* paper, 98 pages, 5½ x 8 inches; published by Hobart Bros. Co., Troy, O., for 50 cents.

Taking Part II of its larger manual, *Arc Welding and How To Use It*, the Hobart company issued this handy volume for the use of welding students and others interested in the practical aspects of the art.

It is used as a textbook in the Hobart welding school as well as in trade schools, colleges and technical institutes. It covers manipulation, welding with bare electrodes, welding and cutting with coated electrodes and welding light gage steel. The volume is well illustrated.

MATHEWS SPRING MOUNTED CONVEYERS



SPRING MOUNTED CONVEYER

CUT MAINTENANCE COSTS

THE principle is simple; the roller axles are rigidly locked in the frame as in the conventional "rigid type" construction, but the conveyer frame which retains the rollers is carried on pre-compressed coil springs. The springs are held in compression equal to the rated safe load of each roller. Under impact conditions or excessive loads the springs absorb the overload.

This construction represents the greatest improvement in roller conveyer in many years. Its application will reduce maintenance costs by prolonging the life of the equipment. When conditions are severe, "spring mounted" is the practical conveyer construction for the job.

Capacities from 150 lbs. to 8000 lbs. per roller available.

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MATHEWS CONVEYER COMPANY
114 TENTH STREET, ELLWOOD CITY, PENNA.

CONTINUOUS FLOW PRINCIPLE OF HANDLING MATERIALS

Weighing Stock

(*Continued from Page* 121)

every 31 seconds. In front of the head house lies the conveyor track upon which these buckets are transported and where they are available for weighing only 1.2 seconds of time. The automatic weigher installed worked satisfactorily under this extremely short time limit.

At coal mines where railway cars are weighed at the mine, such as is common practice in the southern Illinois and Indiana coal fields, the car is allowed to drift under the control of a rider from the loading chute to the storage yard. As it passes the scale enroute, it is automatically weighed for invoicing and waybilling purposes.

The weighing of bank cars at coal mines for production control and for determining the wages due is quite similar to that just mentioned except that the loads are smaller. Where the coal handling system involves a bottom dump, the weighing is done coupled in train between the mine mouth and the dump. At cross-over dumps, the cars are usually weighed after being cut loose from the trip enroute to the dump.

Iron ore is usually weighed while coupled in train between the mines and the docks where it is loaded in ore boats for water transportation. Here the cars are of uniform length and the grades are arranged so that couplers run slack at the scale.

When the busy season arrives, the automatic weighers play an important part in keeping the commodities moving. A record made in the month of July, 1937, indicates that three million tons of ore were weighed on two recorders. It would have taken six weighmasters 31 consecutive days to weigh these 42,858 cars of ore manually.

Blast Furnace Charges: One of the most pressing weighing problems in the steel mills is that of weighing the charges for open-hearth blast furnaces. This is being done for two purposes. The first is to obtain the proper proportions in the charge. The second is to control the amount of steel that comes out of the furnace in terms of the amount of raw material put into it. Here, since the cars are uniform in length and speeds can be controlled, the weighing can be done with the cars coupled in train and moving over the scale.

So much for the basic problems of motion weighing. You may be interested in some of the special applications of dormant weighing.

Dormant Weighing in Industry: Inside the steel mill the most spectacular example of automatic weighing is that of ingots. In the modern mills, this is done between the soaking pit and the rolls. The hot ingot comes from the buggy on the rolls and is moved to a turn table which is also the platform of the scale. An automatic weigher is attached to this scale in the regular way.

While the ingot is being reversed it is weighed but the weight is not printed until the machine comes to balance. Symbols to identify heat number or other information can be set up manually on a keyboard and printed with the weight. Such weighers have a totalizer attached which accumulates the total amount of metal weighed in a heat or shift. When the weighing is completed the machine signals the man in the pulpit who sends the ingot on down the line into the rolling mill.

A remote indicator has been attached to such weighers to reproduce instantly in the roller's pulpit the weight of each ingot shown on the dial of the scale. With this information, he can instantly determine how much slab of a given length and thickness the ingot will roll out and assign the ingot to orders on his hook that will turn out slabs or billets with a minimum amount of scrap.

Weighing by Remote Control: The

A hoist and the track on which it travels are partners for your profit. One should fit the other. That does not mean both must be made by the same manufacturer any more than an automobile tire must be made by an automobile manufacturer.

The Lo-Hed Hoist is built to run on standard I-beams or, with very slight modifications, on any track system. We make neither I-beams nor track systems. We believe that your ability to buy a hoist independent of the track is an advantage in shopping, in making track changes, or in switching the hoist location.

Get this time-tested advantage. While you're about it, look into all the other time-tested features of the Lo-Hed illustrated in the open-view of the Lo-Hed Hoist on this page: Heavy duty hoist type motor, automatic lowering brake, anti-friction bearings, stub tooth spur gears, plow-steel cable, 100% positive automatic upper limit stop, dust and moisture-proof controller. (Construction varies slightly for classes of Lo-Heds.) Investigate Lo-Hed time-tested construction. Write today for the complete Lo-Hed Catalog, using the convenient coupon shown below.

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remote unit installed to weigh incoming trucks of mail. The trucks roll in on the ground floor where two motor truck scales are located. The weight is automatically printed and indicated one floor above and a dual remote indicator, installed on the clerk's desk in an office some distance away, affords a complete control of the weighing operation.

The clerk can signal the trucks when he is ready to weigh; the weight is indicated on the two large dials. If debris collects on either scale platform, it is immediately indicated at the clerk's desk and he can bring the scale back to "zero balance" by pushbutton control. When nonweigh trucks are running over the scale, he can prevent wear on the recorder beam by pressing a button which throws the beam lock. The current which operates the recorder is turned on or off by a push button at either the clerk's desk or at the recorder.

This last example indicates how complex are the requirements of automatic weighers and demonstrates that automatic weighers can be used to speed the handling of loads, eliminate the errors caused by the frailties of human nature, and can save time by placing the responsibility of weighing in the hands of a man performing other duties—even though he be located at a remote point.

■ Factory sales of mechanical stokers in July totaled 16,834 units, compared with 9124 units in June and 9614 in July, 1939, as reported by the bureau of the census. Sales for seven months aggregated 54,230 units; 36,604 in the period in 1939.

Automotive Engineers Nominate 1941 Officers

■ A. T. Colwell, vice president, Thompson Products Co., Cleveland, has been nominated for president, Society of Automotive Engineers Inc., for 1941. David Beecroft, Bendix Aviation Corp., South Bend, Ind., has been nominated as treasurer.

Vice presidents: Aircraft, Mac Short, vice president in charge of engineering, Vega Airplane Co., Burbank, Calif.; aircraft engine, Dr. George W. Lewis, director, aeronautical research, national advisory committee for aeronautics, Washington; diesel engine, L. C. Lichty, associate professor, mechanical engineering, Yale university, New Haven, Conn.; fuels and lubricants, J. B. Macauley Jr., research engineer, Chrysler Corp., Detroit; passenger car, Karl M. Wise, director of engineering, Bendix Products division, Bendix Aviation Corp., South Bend, Ind.; passenger car body, J. R. Hughes, chief body engineer, Studebaker Corp., South Bend, Ind.; production, E. S. Chapman, vice president and assistant general manager, Plymouth division, Chrysler Corp., Detroit; tractor and industrial, Chauncey W. Smith, professor of agricultural engineering, University of Nebraska, Lincoln, Nebr.; transportation and maintenance, T. L. Preble, supervisor, automotive transportation, Tide Water Associated Oil Co., New York; truck, bus and railcar, R. S. Reed, chief engineer, Brockway Motor Co. Inc., Cortland, N. Y.

Members of the SAE council for term of 1941-1942: N. C. Millman, product service manager, General Motors of Canada Ltd.; H. O. Mathews, automotive engineer, Public Utility Engineering & Service Corp.; D. A. Fales, associate professor of automotive engineering, Massachusetts Institute of Technology, Cambridge, Mass.

Continuing on the council will be the following who were elected for two-year terms at the beginning of 1940: Murray Fahnestock, editor, *Ford Field Magazine;* James B. Fisher, vice president, Waukesha Motor Co., Waukesha, Wis.; Austin M. Wolf, automotive consultant. Serving on the council as past presidents will be Arthur Nutt, vice president, Wright Aeronautical Corp., Paterson, N. J., and W. J. Davidson, General Motors Corp., Detroit.

Officers Elected by Mechanical Engineers

■ William A. Hanley, director of Eli Lilly & Co., Indianapolis, and head of its engineering division, was elected by a letter ballot of the 15,000 members of the American Society of Mechanical Engineers to be president of the 61-year-old engineering organization during 1941, according to results today by C. E. Davies, secretary of the society.

Vice presidents elected to serve two-year terms on the council were Samuel B. Earle, research engineer and dean of engineering at Clemson Agricultural and Mechanical college, Clemson, S. C.; Frank H. Prouty, a partner in the Prouty Bros. Engineering Co., and the Industrial Appraisal Co., Denver; and Edwin B. Ricketts, mechanical engineer with the Consolidated Edison Co., New York.

Managers of the society elected to serve on council for three-year terms include Huber O. Croft, professor of mechanical engineering and head of the department at the University of Iowa, Iowa City, Iowa; Paul B. Eaton, consulting engineer, and professor and head of the mechanical-engineering department at Lafayette college, Easton, Pa.; and George E. Hulse, chief engineer, Safety Car Heating & Lighting Co., New Haven, Conn.

The officers will be installed during the society's annual meeting in New York, at Hotel Astor, Dec. 2-6.

■ Malleable iron castings production in August totaled 48,926 net tons, compared with 38,872 tons in July and 40,212 tons in August, 1939, the bureau of the census reports. Cumulative production for eight months this year was 335,954 tons, compared with 272,082 tons in the corresponding period last year. Orders booked in August totaled 52,994 tons, compared with 45,025 tons in July and 40,005 tons in August, last year.

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MEETINGS

MANAGEMENT MEETING IN CLEVELAND, NOV. 12-13

■ PRODUCTION executives from various companies will meet under the auspices of the production division, American Management association, in Cleveland, Nov. 12-13, to discuss manufacturing problems created by the preparedness program.

W. A. PERRY TO ADDRESS PITTSBURGH GROUP

W. A. Perry, superintendent of electrical and power departments, Inland Steel Co., Indiana Harbor, Ind., will speak on "Systematic Inspection and Maintenance of Steel Plant Electrical Equipment," before the Pittsburgh section of Association of Iron and Steel Engineers, William Penn hotel, Pittsburgh, Oct. 21.

SCHEDULES FALL MEETING OF STEELWORKS OPERATORS

Ohio section of the Open-Hearth Committee of American Institute of Mining and Metallurgical Engineers will hold its fall meeting at the Deshler-Wallick hotel, Columbus, O., Oct. 18. The morning of Oct. 19 will be devoted to inspection trips to Battelle Memorial Institute laboratories or Buckeye Steel Castings Co.'s open-hearth and foundry, and the afternoon to the football game between Ohio State and Minnesota.

MECHANICAL ENGINEERS TO MEET IN NEW YORK

More than 100 technical papers will be presented at the sixty-first annual meeting of the A. I. M. E., Hotel Astor, New York, Dec. 2-6. The banquet will be held Dec. 4.

TO EXHIBIT POWER UNITS AT A.S.M.E. MEETING, DEC. 2-7

Companies specializing in powerhouse and plant equipment and supplies will display their products at the fourteenth national exposition of power and mechanical engineering. Grand Central Palace, New York, Dec. 2-7. The exhibit will coincide with the American Society of Mechanical Engineers' meeting.

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Convention Calendar

Oct. 14—Society of Automotive Engineers. Annual dinner, Hotel Commodore, N. Y. John A. C. Warner, 29 West Thirty-ninth street, New York, is secretary.

Oct. 14-16 — American Gear Manufacturers association, twenty-third semiannual meeting, Skytop Lodge, Skytop, Pa. J. C. McQuiston, 602 Shields building, Wilkinsburg, Pa., is secretary.

Oct. 15-18—American Institute of Steel Construction. Eighteenth annual convention, Greenbrier hotel, White Sulphur Springs, W. Va. V. Gilmore Iden, 101 Park avenue, New York, is secretary.

Oct. 16-18—Porcelain Enamel Institute. Fifth annual forum, University of Illinois, Urbana, Ill. Charles C. Pearce, 612 N. Michigan avenue, Chicago, is managing director.

Oct. 17-19—American Society of Tool Engineers. Semiannual meeting, Cincinnati. Ford R. Lamb, Boulevard Temple building, 2567 W. Grand boulevard, Detroit, is secretary.

Oct. 21-22—Associated Machine Tool Dealers of America. Annual convention, Dayton Biltmore hotel, Dayton, O. Thomas A. Fernley Jr., 505 Arch street, Philadelphia, is secretary.

Oct. 21-25—American Institute of Mining and Metallurgical Engineers. Fall meetings, Iron and Steel and Institute of Metals divisions, Hotel Statler, Cleveland. A. B. Parsons, 29 West Thirty-ninth street, New York, is secretary.

Oct. 21-25—American Society for Metals. Twenty-second national metal congress and exposition, Public auditorium and Hotel Statler, Cleveland. W. H. Eisenman, 7301 Euclid avenue, Cleveland, is secretary.

Oct. 21-25—American Welding society. Twenty-first annual meeting, Cleveland hotel, Cleveland. Miss M. M. Kelly, 33 W. 39th street, New York, is secretary.

Oct. 21-25—Wire association. Annual meeting, Carter hotel, Cleveland. Richard E. Brown, Stamford Trust Co. building, 300 Main street, Stamford, Conn., is secretary.

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CAPACITIES 1 TO 450 TONS

Selective 5-Speed Push Button Control applied to a Shepard Niles Inner-Running Trolley Crane.

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Contributing so greatly to the modern comforts of man, we recognize the magnitude of his great leadership.

Booth G-2
National Metals Exposition

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THE ELECTRO ALLOYS COMPANY
CASTINGS FOR HEAT CORROSION
ELYRIA, OHIO
QUALITY CASTINGS SINCE 1919

Booth G-2
National Metals Exposition

INDUSTRY TURNS TO METALLURGICAL HEADQUARTERS

HUNDREDS of letters are pouring in to American Society for Metals headquarters. Confronted with the pressure of defense production, industry is turning to the ASM for information on metals, on production, treatment, fabrication and application. It is turning to the Society founded during the years of the first World War and which today has more than 11,000 members in all the metal industries.

These men enjoy many benefits as ASM members. In publications alone they receive back *three times* the cost of membership. And at regular meetings of the 50 ASM chapters they hear selected speakers discuss the technical problems of their industry . . . take part in round table meetings . . . make plant inspection trips . . . and mix with the leaders in the metal industry.

Other Society activities include sponsoring the annual National Metal Congress and Exposition (described in detail on the following pages), educational work, book and library services, and a nation-wide employment service to members.

Make the American Society for Metals *your* headquarters for up-to-date metallurgical information.

AMERICAN SOCIETY FOR METALS

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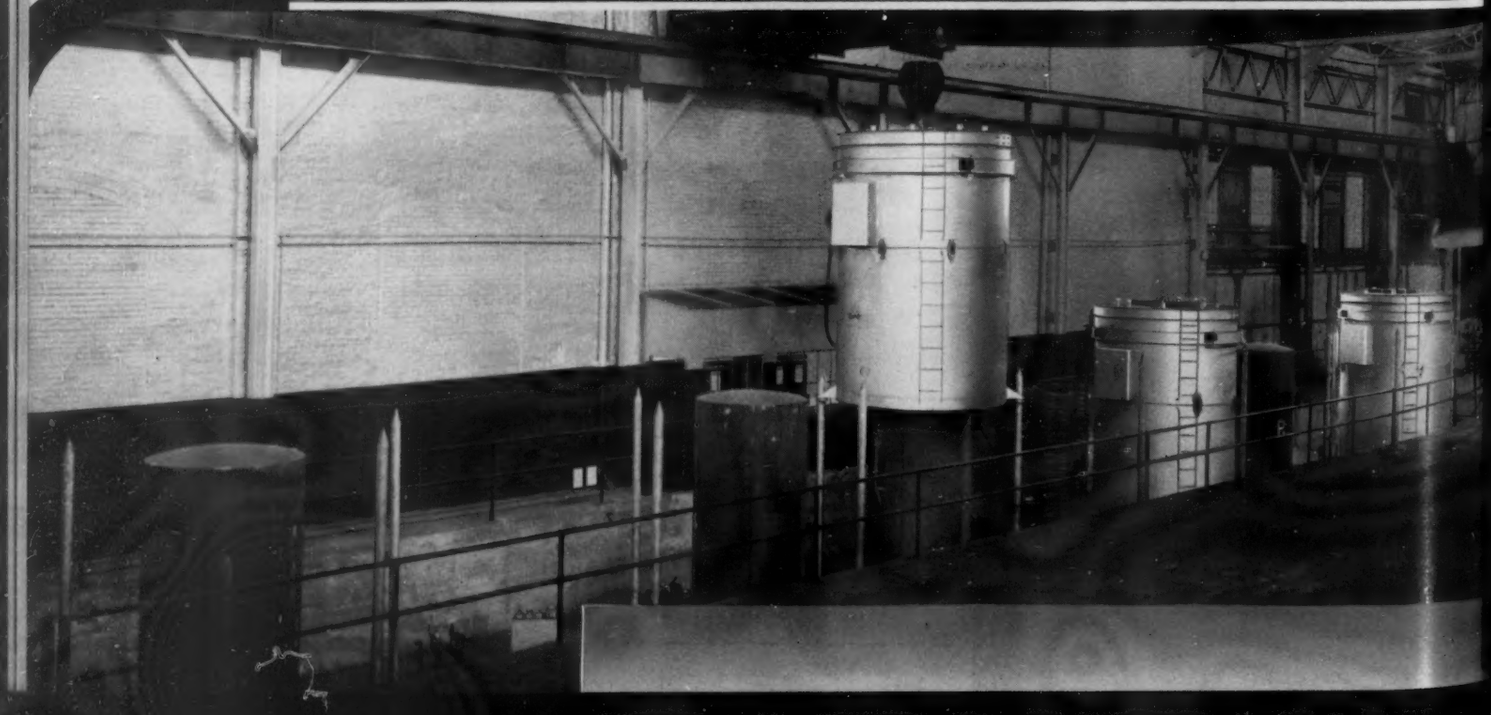

SPECIFICATIONS

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"No part of the charge shall at any time during the heating-up and soaking periods exceed the maximum desired temperature nor shall the differential between any portions of the charge exceed 25°F. after the desired control temperature is reached - the cooling rate shall be 5° to 100°F. per hour down to [CENSORED]°F."

(EXCERPT FROM SPECIFICATIONS OF WELL-KNOWN MANUFACTURER)

● Such were the specifications in part of a large wire and rod manufacturer when asking for bids on eight radiant tube covers for annealing and spheroidizing. This is typical of many specifications being met daily by SC covers for wire and rod.

It was a simple matter to meet these specifications with the patented Surface Combustion Radiant Tubes. The illustrations show a portion of the eight covers comprising this one installation. Numerous others are in use by many leading manufacturers.

Both low and high carbon steel, and low and high carbon alloy steel are heat treated. Each base will accommodate one pile of coils 30" to 44" O.D., or two piles 24" to 26" O.D., or three piles 21" to 23" O.D., stacked to a height of 90 inches. The weight of each charge varies from 3200 to 7000 lbs., depending on the loading. With a cold cover, a charge of 4800 lbs. can be heated to 1380° F. in five hours. On such a heat, the fuel consumption is between 1,000,000 and 1,250,000 Btu's per ton. With a hot cover the fuel consumption is considerably less . . . Request an SC engineer to call and discuss your annealing problems with you . . . of course at no obligation.

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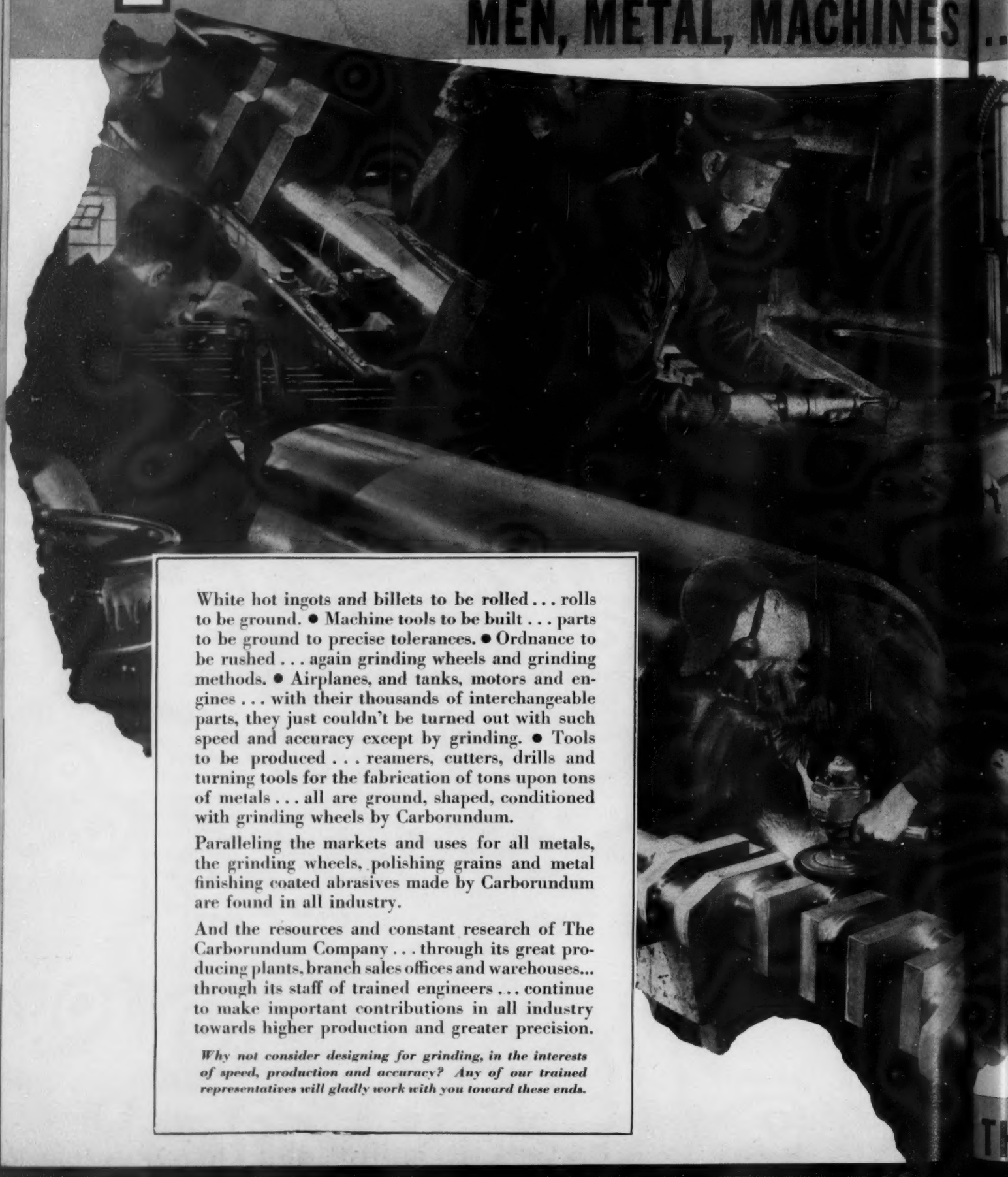
4 great factors in p

MEN, METAL, MACHINES ..



White hot ingots and billets to be rolled . . . rolls to be ground. • Machine tools to be built . . . parts to be ground to precise tolerances. • Ordnance to be rushed . . . again grinding wheels and grinding methods. • Airplanes, and tanks, motors and engines . . . with their thousands of interchangeable parts, they just couldn't be turned out with such speed and accuracy except by grinding. • Tools to be produced . . . reamers, cutters, drills and turning tools for the fabrication of tons upon tons of metals . . . all are ground, shaped, conditioned with grinding wheels by Carborundum.

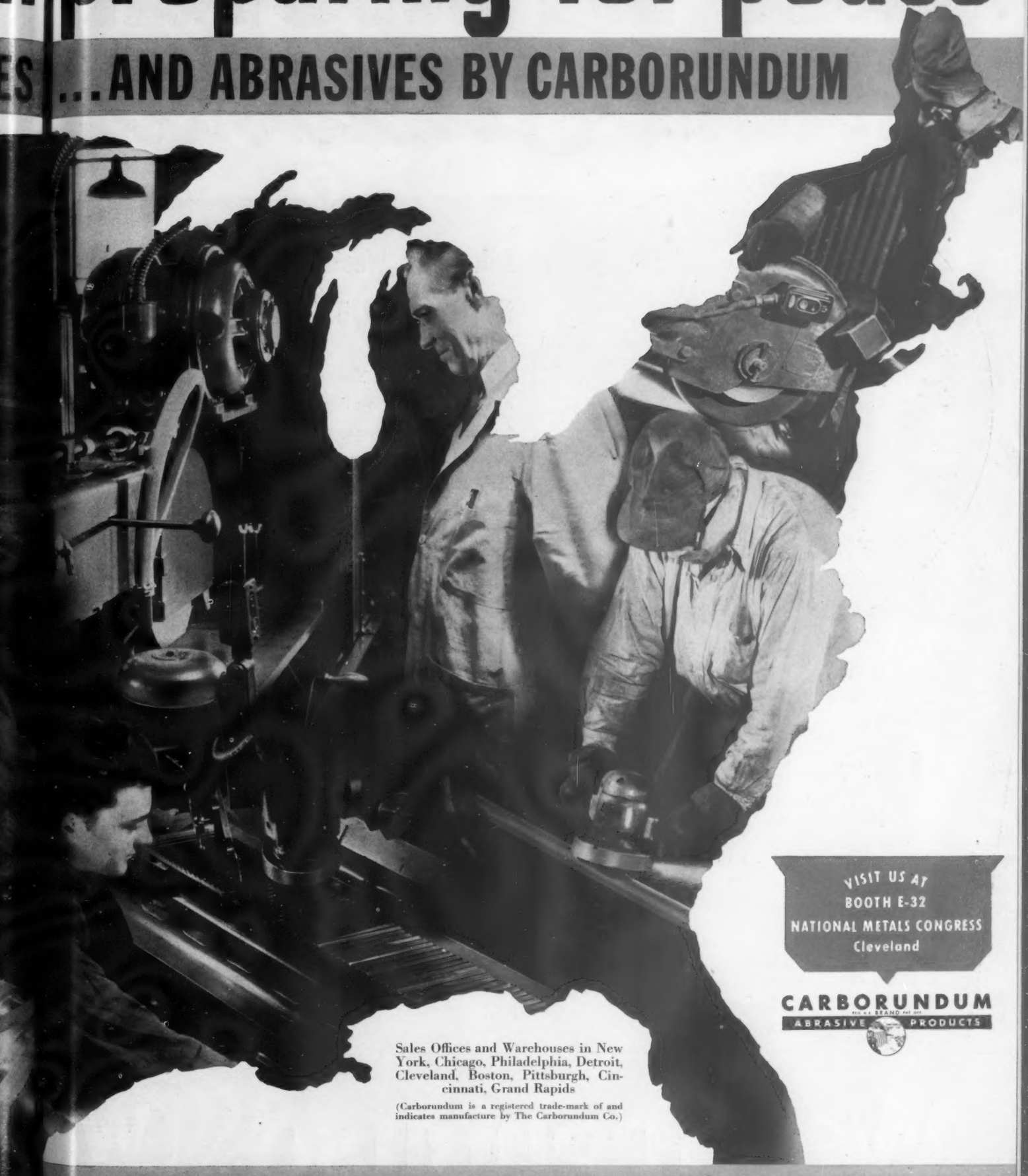
Paralleling the markets and uses for all metals, the grinding wheels, polishing grains and metal finishing coated abrasives made by Carborundum are found in all industry.

And the resources and constant research of The Carborundum Company . . . through its great producing plants, branch sales offices and warehouses... through its staff of trained engineers . . . continue to make important contributions in all industry towards higher production and greater precision.

Why not consider designing for grinding, in the interests of speed, production and accuracy? Any of our trained representatives will gladly work with you toward these ends.

preparing for peace

...AND ABRASIVES BY CARBORUNDUM



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Cleveland

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ABRASIVE PRODUCTS

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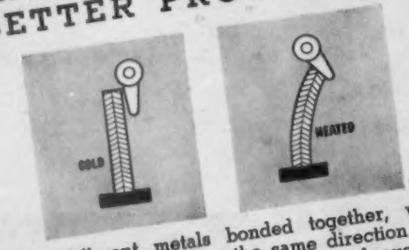
(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Co.)

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Get Bi-Metal ... and Eliminate

HERE'S HOW BI-METAL SAVES MONEY... GIVES BETTER PROTECTION

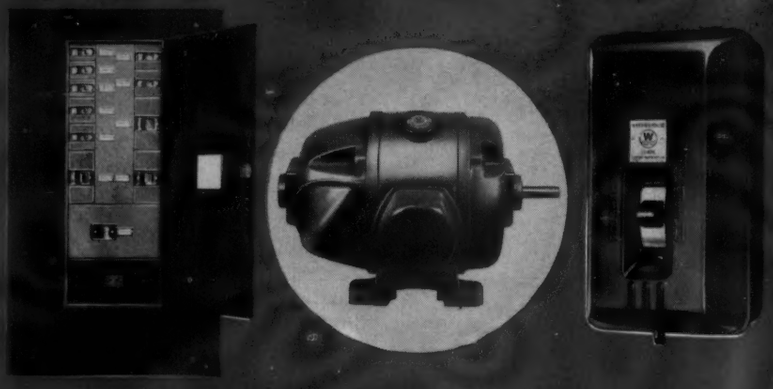


Two different metals bonded together, when heated always bend in the same direction. The heat from short circuit or continued overload currents causes the Bi-Metal, which is exactly calibrated to the job at the factory, to act and open the circuit. Because of Bi-Metal's characteristics, its accuracy never changes, regardless of the number of operations. There's nothing to replace . . . nothing to wear out.

Ask Your Westinghouse Representative For This Bi-Metal Demonstration

Make This Test Yourself. . . . A strip of Bi-Metal and a match are all you need to prove to yourself the time and moneysaving advantages of Bi-Metal Protection. Ask your Westinghouse Representative for a Bi-Metal Demonstration Kit.

YOU PAY NO MORE FOR BI-METAL PROTECTION IN THIS WESTINGHOUSE EQUIPMENT



LIGHTING AND POWER PANELBOARDS
Bi-Metal protects circuits and eliminates fuses. "De-ion" arc quenchers save contacts. Tamper-proof.

THERMOGUARD MOTOR
Single-phase sizes up through 2 hp. Impossible to burn out. Bi-Metal gives positive protection at all times.

"DE-ION" MOTOR WATCHMAN
Manual motor starter for motors up to 7½ hp. Bi-Metal overload protection. "De-ion" arc quenchers. On-Off-Tripped self indicating.

Westinghouse

W
WESTINGHOUSE ELECTRIC

Protection
Fuse Replacements

NOTHING TO RENEW OR REPLACE WITH *NOFUZE* CIRCUIT BREAKERS

Bi-Metal has changed all ideas about circuit protection. It's no longer necessary to spend time and money for fuse replacements. Westinghouse Nofuze Breakers eliminate fuses and give positive, accurate protection.

Bi-Metal opens the circuit instantly when a dangerous overload or short circuit occurs. To restore the circuit, just move the operating lever to "RESET" and then to "ON" position. There's nothing to renew or replace.

You save outage time . . . save maintenance time . . . save replacement costs. Give your men and machines the safe, accurate protection of Bi-Metal. You get these savings at a cost that is often less than a complete switch and fuses. Specify Westinghouse Nofuze Breakers on your next installation.

"DE-ION" ARC QUENCHERS AT NO EXTRA COST

Westinghouse "De-ion" arc quenchers confine, divide and extinguish the arc instantly . . . preventing burning and prolonging the life of contacts.

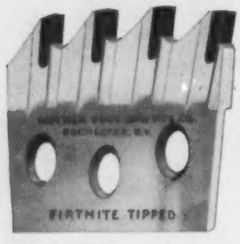
Westinghouse Electric & Mfg. Co.

J-90339

NOFUZE CIRCUIT BREAKER—"ON," "OFF" and "TRIPPED" positions clearly visible. Safety interlock prevents cabinet door from being opened when in "ON" position

Motors and Control

HUTHER SAWS



Segment with Firthite tips for Huther Bros. Patent Inserted Tooth Saw.

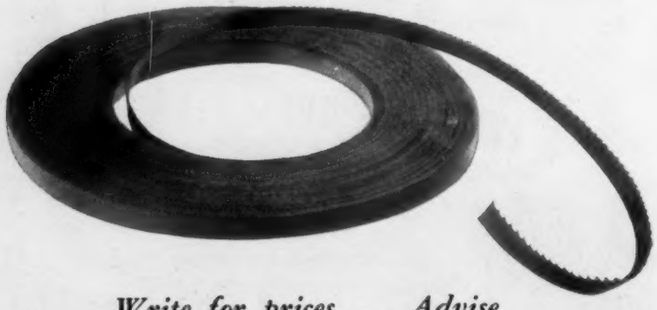
Huther Bros. Patent Inserted Tooth Milling Saw with inserts of best quality High Speed Steel, the ideal saw for cutting brass, copper, and aluminum, leaves cut perfectly smooth —a real production tool. Saw has side clearance, sharpen on top of tooth only. Let us tell you more about this saw.

FIRTHITE TIPPED SAWS

FIRTHITE-TUNGSTEN CARBIDE, made by Firth Stirling Steel Co., is used for tipping this saw. For cutting non-ferrous metals, fibres, plastics, etc. Write for full information.

• • •

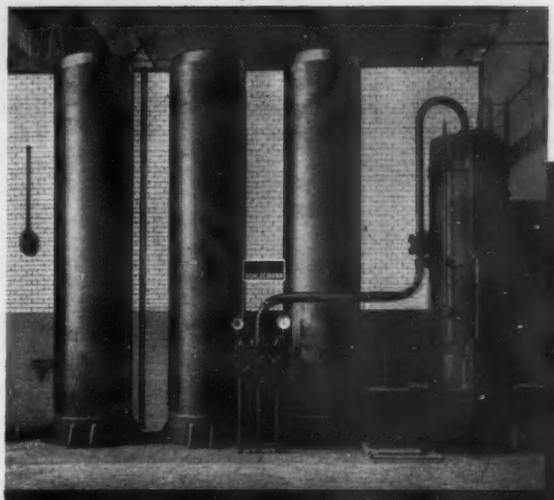
HUTHER SEMHI HARD EDGE
(TRADE MARK)
METAL CUTTING BAND SAW



Write for prices . . . Advise material to be cut and speed

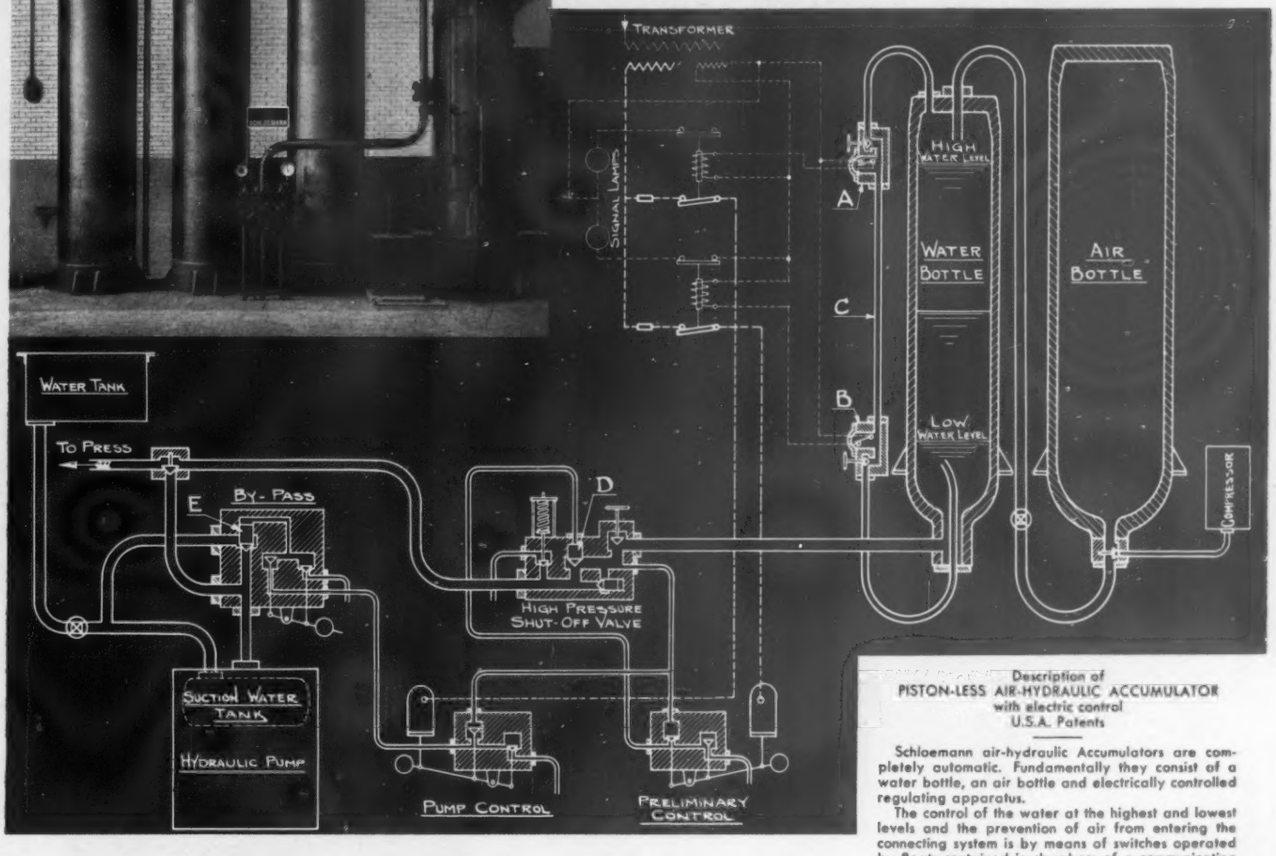
HUTHER BROS. SAW MFG. CO.

ROCHESTER, N. Y.



Accumulators furnished in sizes from fifty gallons to twenty-five hundred gallons and for pressures up to forty-five hundred pounds per square inch.

System shown at left has two hundred gallons capacity and is designed for twenty-eight hundred and fifty pounds per square inch pressure.



Description of
PISTON-LESS AIR-HYDRAULIC ACCUMULATOR
with electric control
U.S.A. Patents

Schloemann air-hydraulic Accumulators are completely automatic. Fundamentally they consist of a water bottle, an air bottle and electrically controlled regulating apparatus.

The control of the water at the highest and lowest levels and the prevention of air from entering the connecting system is by means of switches operated by floats contained in chambers of a communicating tube "C." Thus the switch "A" in the upper chamber controls the operation of the hydraulic pump, while that in the lower chamber "B" controls the check valve "D" which shuts off the accumulator at lower water level.

The continuous running pump is controlled by closing the By-Pass check valve "E" by means of the pump control, causing it to idle by opening the same and returning the water to the suction end. Over-pressure is released through safety valves and is indicated by an alarm.

SCHLOEMANN

AIR-HYDRAULIC ACCUMULATORS

HYDRAULIC EXTRUSION PRESSES

HIGH PRESSURE PUMPS

COMPLETE HYDRAULIC SYSTEMS

SCHLOEMANN
ENGINEERING CORP. — Rolling Mill Machinery
PITTSBURGH, PA. — Hydraulic Presses

I thought I knew, but it wasn't enough.

YES, I know MO-MAX High Speed Steels. I read and I get around. But I didn't know enough to make me use MO-MAX in our shop until a real salesman showed me records that made ours look sick. He showed me what we were losing by not getting twenty per cent greater efficiency in our high speed lathe tools, broaches, drills, reamers, hack saws and a lot of other applications for which we were using other high speed steels. He made a hit and has our business cinched. I'm kicking myself for not having started to use MO-MAX six years ago when I first heard of it. The savings in production cost and tool cost look good on our records. They would on anybody's.

MO-MAX

TRADE MARK REG. U. S. PAT. OFF.

MOLYBDENUM-TUNGSTEN HIGH SPEED STEELS

Leading steel companies can supply you with their licensed brands of MO-MAX. For booklet with technical data and sources of supply, write The Cleveland Twist Drill Company, Cleveland, Ohio.

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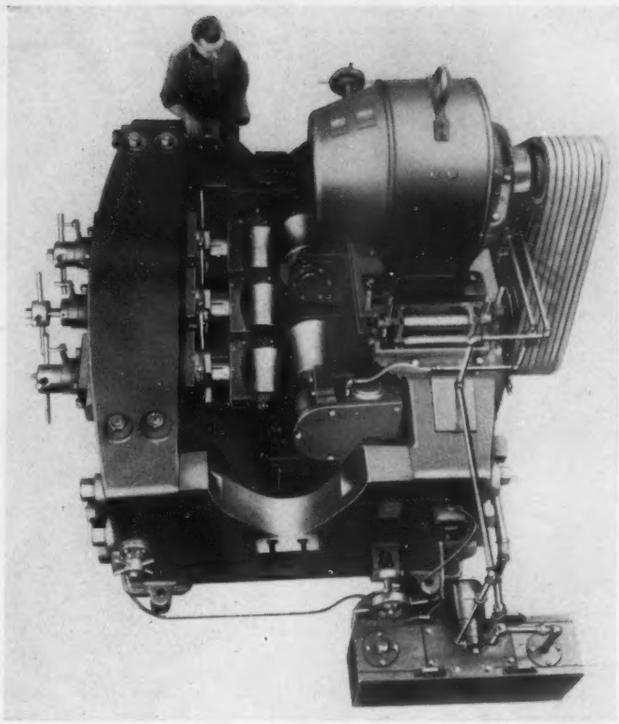
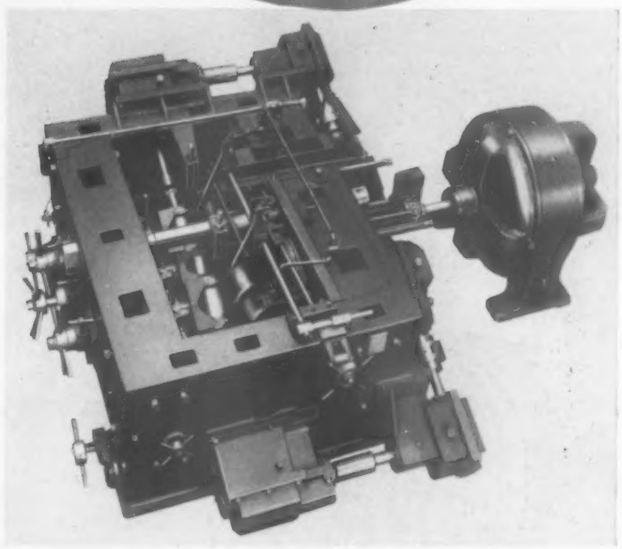
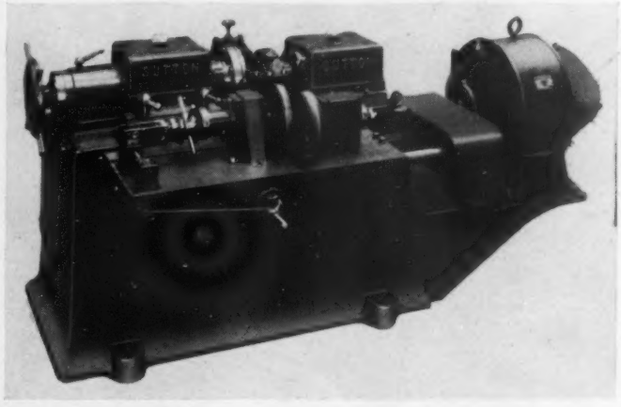
New SUTTON MACHINES



2BM STRAIGHTENER AND 1½B SIZING MACHINE

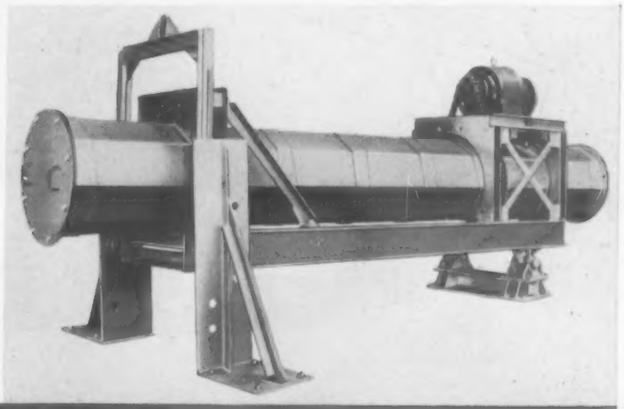
These machines, like other SUTTON units, are too bulky to send out on trial; however, many clients take advantage of our offer to demonstrate at our plant. Illustrated above is our No. 2 B M machine; this is being used extensively on the new continuous butt weld mills, finding increasing favor with use. Illustrated at the right is our 1½ B heavy duty 4-roll driven sizing machine; micrometer dial screw-downs aid materially in developing amazing accuracy.





POLISHER . . . Above is a cut of our improved polisher. Its disc polishing action produces a high lustre on ferrous and nonferrous rods. When specifications call for particularly fine polish, the SUTTON POLISHER delivers the stock mirror-smooth every inch of its length.

DESCALER . . . Pictured below is the SUTTON ROTARY DESCALER and CLEANER. It can remove rust and loose scale from any hot rolled bar section manufactured, as well as from all structural shapes and narrow plates. It is also serviceable in applying paint or rust proof coatings.



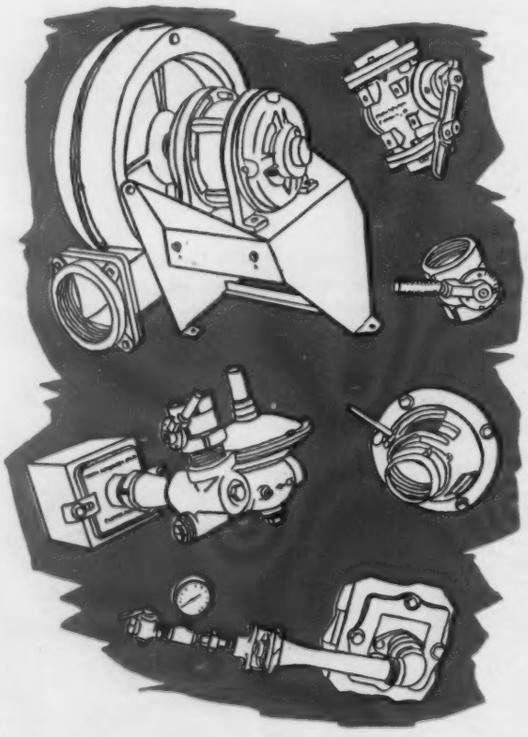
SUTTON ENGINEERING CO · PARK BLDG., PITTSBURGH (PLANT—BELLEFONTE, PA.)

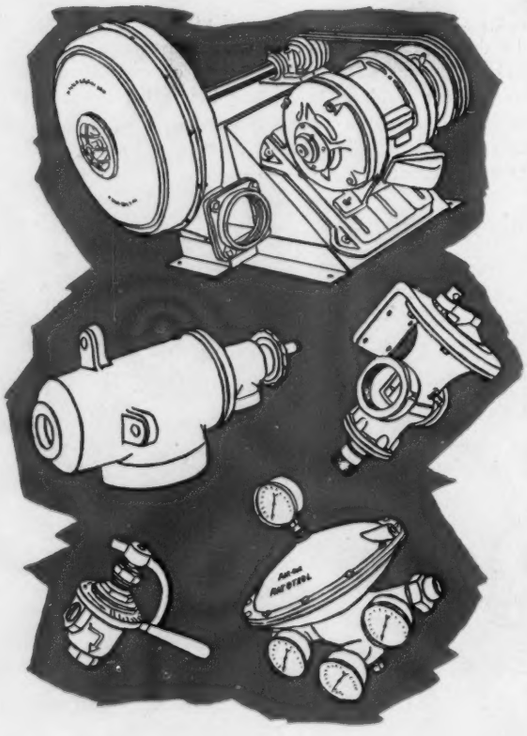
NORTH AMERICAN

COMBUSTION

AIDS

INDUSTRY *and* DEFENSE





THE NORTH AMERICAN MANUFACTURING COMPANY

MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS AND OIL

2910 EAST 75TH STREET CLEVELAND, OHIO

National Metal Congress and Exposition

SUPPLEMENT
STEEL
October 14, 1940

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1940
OCTOBER
OCTOBER
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The National Metal Congress & Exposition Cleveland

New Aids to Production

■ ALWAYS an affair of high interest to the metal and allied industries, the National Metal Congress and Exposition for 1940 has unusual significance. This is because of the effect of the national defense effort in placing emphasis on production.

* * * *

This is one year when the average manufacturer is relieved of doubts as to whether business in the future will be "good" or "bad." He is relieved to a large extent of questions as to whether to expand, or modernize, his plant. Realizing that the nation is in deadly earnest in arming to the teeth in order to safeguard its position in a dangerous world, the average manufacturer has the assurance that a combination of demands—both for equipment and materials of peace as well as equipment and materials of war—will keep his plant fully occupied for as far ahead as he can see at this time.

No matter what crises are reserved for this country in the future—and he sees grave possibilities in this direction as a result of our cock-eyed economic policies in recent years—the average manufacturer knows that he is playing safe at this time when he plans for a large volume of business for some years to come.

* * * *

This year's NMCE slogan, "New Aids to Production" is, therefore, highly appropriate to the times. The deliberations at the various sessions of the congress,

Below, Cleveland hotel, and group of terminal buildings as seen from west end of High Level bridge. At right, air view looking south from Lake Erie toward Cleveland's main business district with the Terminal tower at extreme right

the exhibits at the exposition, all will be in keeping with this theme. They will reveal how quality may be improved, how man-hour output may be increased, how production costs may be lowered.

Because industry is in vital need of such information at this time, the National Metal Congress and Exposition this year is expected to draw unprecedented attendance. Certainly, in the circumstances, it is an event which will not be ignored by progressive and responsible men in industry.

* * * *

The combined affair will be held—for five days beginning Oct. 21—in Cleveland, a location not only favorable to the great north central industrial area but easily accessible to Canada.

* * * *

The exposition will occupy both the upper and lower levels of the great Cleveland underground exposition hall and annex as well as the north hall and the main exhibition hall. As described by William H. Eisenman, managing director, it will be the largest in history—20 per cent larger than the 1939 exposition in Chicago. Participating will be 325 exhibitors who will occupy more than 100,000 square feet of exhibit space. "Working" exhibits will be the rule wherever practicable, with attendants on hand to demonstrate and answer questions.

Names of exhibitors and the nature of their exhibits will be found on pages 237-243 of this issue.

* * * *

The congress will consist of extensive technical programs of the American Society for Metals, the American Welding society, the Wire association and the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers. Technical sessions will be held in three Cleveland hotels and in the large meeting rooms in the Cleveland public auditorium.

Headquarters for the American Society for Metals will be in Hotel Statler, Cleveland. Headquarters of the American Welding society and American Institute of Mining and Metallurgical Engineers will be in Hotel Cleveland. Headquarters for the Wire association will be in Hotel Carter.

Hotel reservations are being made direct with hotels, also through Mark Egan, executive vice president of the Cleveland Convention and Visitors' bureau, who is chairman of the housing committee.

Complete programs covering the technical sessions of the congress will be found on pages 225-234 of this issue.

* * * *

STEEL joins in welcoming to the 1940 National Metal Congress and Exposition those thousands of men of the metals and associated industries who are eager for progress, especially at a time when progress is so closely associated with patriotism!

Metals in 1940

. . . . . PRODUCTION . . . . . FABRICATION . . . . . .

CO-ORDINATION PROGRAM OUTLINED FOR CONSERVATION OF ALLOYS

BY A. HURTGEN
Chief Metallurgist,
Henry Vogt Machine Co., Louisville, Ky.

■ PRESENT engineering requirements for equipment for service at temperatures below minus 20 degrees Fahr. present a more difficult problem for the materials engineer than in former years because of the low-temperature impact test requirements. While similar equipment made years ago did not require such acceptance tests, the operating conditions of the equipment were not as severe as they are today. For temperatures below minus 90 degrees Fahr., killed carbon steels given additional special ladle deoxidation are not consistently good and so alloying elements come into the picture. Nickel in amounts from 1.50 to 3.75 per cent possibly has been the most prevalent alloying element for materials intended for use below minus 90 degrees Fahr.

The question as to whether additional refinements in both carbon steel melting and deoxidation practice will result in satisfactory materials for the low temperature conditions and thus extend the practical limit for annealed and/or normalized steels beyond minus 90 degrees Fahr. is a question not entirely answered. Of course, there have been a great many instances of alloy materials having been sold and used extravagantly for applications where a good grade of carbon steel would have served just as well. Steels for corrosion and high temperature applications and possibly some tool steel uses necessarily involve high alloying but lower alloying can be affected without important sacrifice of engineering properties in numerous other applications. These comments apply generally.

If our valuable alloys are to be conserved, there must be a definite program. One suggested is:

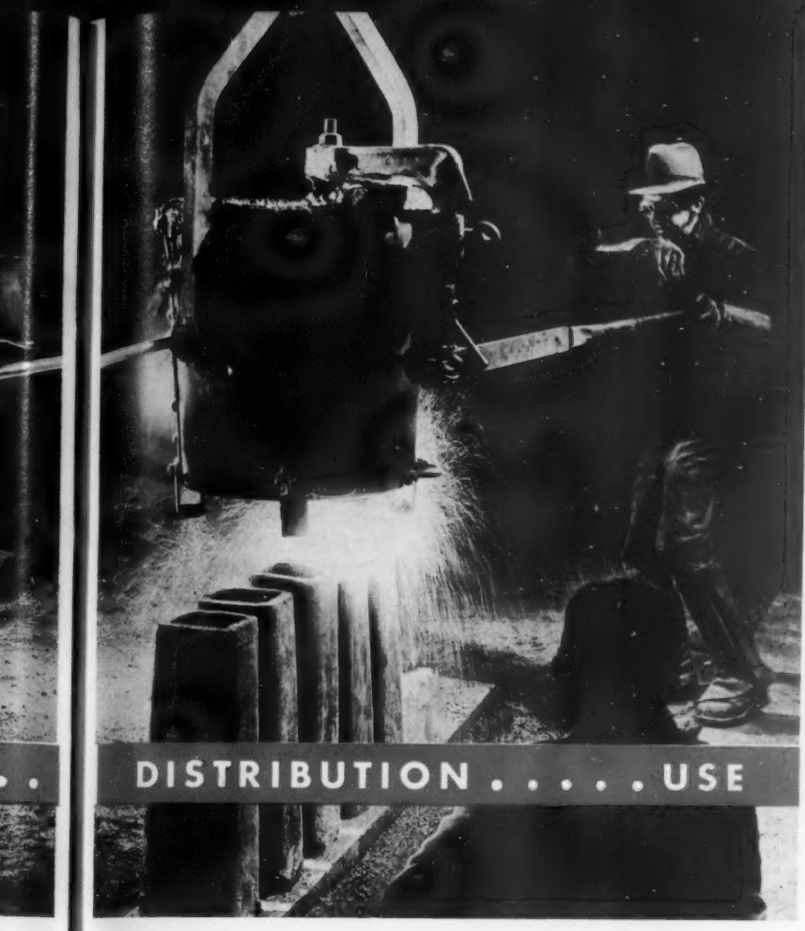
More precise knowledge of the design requirements by the designing engineer, thus enabling a more intelligent selection of material for the specific application; unreserved co-operation on the part of the steel manufacturer in producing higher quality material through improved melting processes and refined technique in finishing and deoxidizing the heats; precise methods for conditioning and heat treating the materials to obtain the maximum properties and meet the design specifications, involving adequate equipment and intelligent procedure. With the strategic importance of many of our alloys, great conservation can be effected through the adherence to such a program of co-ordinated effort among the designer, the steel producer and the customer or fabricator.

NATIONAL DEFENSE SEEN CLOSELY TIED TO METALLURGICAL PROGRESS

BY J. H. HRUSKA
Chief Metallurgist,
Electro-Motive Corp., LaGrange, Ill.

■ NO OTHER period in America's short but dynamic history of applied metallurgy is of greater importance to the national well-being than the present one. From both sides of this hemisphere, the American way of thinking as well as the economic aspects of American life are being challenged. The spectacular collapse of admittedly great military organizations in recent months brought about rather drastic changes in the viewpoint of national defense. Where yesterday, clever strategy and effective cannon played the most important role in defensive measures, there is today a deviation toward combined engineering skill and industrial resourcefulness. If the information assembled by the National Research council is any criterion of progress made between the last World War and the 1940 National Metal Congress, then we may be justified in claiming undisputable world leadership in any such program.

However, it is quite imperative that the greatest defense industry in the world should adopt time-honored experiences and business methods of all other industries before delving wholeheartedly into rearmament. Thus it will be necessary to co-ordinate not only procurement of war and navy materiel but to think seriously in terms of essential future developments—especially along metallurgical lines. The undisputable success of most



American metallurgical industries as well as their supremacy in international competition always depended on accomplishments of lively and practical research. The Army and Navy Munitions board has surveyed the entire field of materials necessary for an independent defense program. According to its findings, there are metals which are strategically critical. Since they are not available in ample quantities for an independent program, research facilities of the nation are of utmost importance in developing not only substitutes but in inventing processes whereby such metals may be developed from otherwise unprofitable ores or by-products.

Let us review the small but economically impressive group of these materials. Strategically, the most important elements are antimony, chromium, manganese, mercury, nickel, tin and tungsten. Those metals not available in sufficient quantity or for which we do not have sufficient manufacturing equipment are aluminum, platinum and vanadium. It is true that the government has purchased large amounts of these metals already. However, metallurgical research should very definitely and at once, inaugurate practical research programs under the direction of a governmental director to eliminate this obstacle to a really efficient national preparedness.

The National Research council reports that there are some 2000 companies who maintain research laboratories in the United States. Of these, only a small proportion is devoted to strictly metallurgical work. It would definitely help to draw on the experiences of this small group of industrial laboratories.

Due to the character of this work, an independent research organization should have headquarters strategically located somewhere in the geographical center of the United States to be available on short notice to either Atlantic or Pacific military headquarters.

Irrespective of the known and quite general friendly enmity of industrial competition, there should predominate a determined unity in helping the interests of national preparedness by co-ordinating the work of private industries to such an extent as to make all important experiences and progress of the metallurgical industries immediately available for paving the way for an invincible army, navy and air force. Only by co-ordinating all these efforts in an efficient business-like and speedy manner will we achieve the desired safety of our country.

Let us make America strong!

SMELTING BOLIVIAN ORES HERE MAY HELP SOLVE OUR TIN PROBLEM

BY J. R. TOWNSEND
Materials Standards Engineer,
Bell Telephone Laboratories, New York

■ OUTSTANDING developments in metallurgy during the past year have involved development and extension of new processes for the fabrication of metals rather than the introduction of new metals of great engineering promise. New materials worthy of mention include:

Grainal process for the manufacture of steel obtains, through the addition of small amounts of vanadium. aluminum and titanium, a product of greater hardenability and toughness than possible with steels of the same composition but made without the minute amounts of these elements.

Introduction of PDCP copper made from the extrusion of briquetted cathode copper offers considerable promise. In this process, an oxygen-free copper is produced having a better surface than that normally resulting from other processes. The material has high ductility and conductivity and is free from defects ordinarily in copper produced by conventional processes.

In the field of magnetic materials, Vicalloy, an alloy of cobalt, iron and vanadium, has been produced. It can be drawn or rolled and heat treated. With proper mechanical treatment, Vicalloy in the form of wire or thin tape is capable of retaining a large amount of magnetic energy.

The threatened curtailment of tin shipments to the United States has led to a considerable amount of development work to obtain a suitable substitute for tin, particularly for the manufacture of containers for foods, liquids and other products. Three possible processes are available including the silver plating of the steel plate, the application of black lacquers and the corronizing treatment. The latter involves the electroplating of a base metal with two materials which, in the case of foods, would probably be nickel and tin. This is followed by a heat treatment. By this combined process, a satisfactory protective coating can be obtained with thinner deposits. Amount of tin required may be 50 per cent less than that previously necessary. In case it becomes necessary to divert most of the available tin for national defense uses, these processes may be widely used.

Similarly, the threatened curtailment of tin which is largely smelted in the United Kingdom has led to the construction of two commercial smelters here, one by the American Metals Co. at Carteret, N. J., which is producing approximately 35 to 40 tons per month of metal by the electrolytic process, and a second plant by the Phelps Dodge Corp. at Laurel Hill, L. I., with potential capacity of 100 tons per month. Expansion of these facilities to permit the smelting of Bolivian ores in this country would make it possible to supply a part of our normal tin requirements domestically.

National defense requirements for various materials have expedited the correlation of various governmental and commercial specifications. Common nonferrous specifications covering ordnance materials have been issued by the ordnance department and the American Society for Testing Materials. Further standardization in both the ferrous and nonferrous industry will be effected when the tentative standard gage sizes proposed by the American Standards association are adopted for sheet, strip and wire. This will materially reduce the number of items carried in warehouse stocks and expe-

dite delivery — an important advantage at this time.

National defense requirements should also increase the use of electroformed dies made by the Ekko or similar processes for the manufacturer of parts made by plastic molding, diecasting, stamping, forming, press ing and forging. The Guerin process employing a rubber blanket in connection with a punch and a cast female die will probably be more widely used as orders are obtained for additional aircraft.

MANGANESE BASE ALLOYS—NEW METALLURGICAL DEVELOPMENT

BY R. H. HARRINGTON
Research Laboratory,
General Electric Co., Schenectady, N. Y.

■ METHODS of processing and production have dominated the field of metallurgy during the present year. There is marked emphasis on the relation of high-temperature creep to rupture test results; controlled gas atmosphere development; structural changes and recovery in the hot and cold working of alloys; the strength of alloys under combined stresses; the evaluation of results of high-velocity impact tests; new studies of prerecrystallization heat treatments developing improved properties in bronzes, brasses, etc., with the suggestion of new principles governing the recrystallization of cold-worked solid solution alloys; and, finally, the American Society for Metals' symposium on the "Surface Treatment of Metals." The austenitic transformation, grain size effects, and hardenability tests are continually being developed for the various types of steels.

Among the really new alloy compositions are those with a manganese base. These are so new that engineering evaluation cannot yet be made.

World conditions and the United States national defense program are providing a new and forceful stimulus in the development of new alloys and new processes to effect the conservation of tin and cobalt, strategic metals not economically available within our boundaries. Already there are marked results in the conservation of bronzes, but the cobalt situation eludes solution. Whereas the use of nickel and emphasis on the lower tin bronzes will very likely ease the tin striction, cobalt seems to be a metal metallurgically without a substitute. One wonders if there might be undiscovered sources of cobalt in Alaska or in the Antarctic. New aluminum and magnesium base alloys and applications of these alloys also are rapidly developing.

One unfortunate aspect inherent to the stimulus of national defense is the need for localized secrecy and the maintenance of files of confidential information. Nevertheless, the next five years should result in metallurgical developments that may dwarf the results of the past ten years.

NEW ALLOY ADDITIONS GREATLY IMPROVE LOW-ALLOY STEELS

BY JEROME STRAUSS
Vice President,
Vanadium Corp. of America, New York

■ THE DRIFT toward wider use of electric furnaces of large capacity in producing low alloy steels to rigid specifications, commented on in 1939, has been further emphasized by larger electric furnace installations, some just completed, and others under construction. It appears that the easier road to uniformity has been quickly followed. Progress in open hearth operation has also been significant. Mention was made previously that design refinements and co-ordination of mechanical and metallurgical research, demanded for successful performance an increasingly close similarity of successive heats of steel, had stimulated research in open-hearth steelmaking, especially refining and deoxidizing reactions. These also are a factor in electric furnace progress. Among recent important metallurgical developments are alloys that enhance hardenability simultaneously with improving ductility and impact resistance in the quenched and tempered state. Variations in these two properties from melt to melt also appear to be greatly minimized by the addition of the new grainal alloys. Certain steel sections are not capable of complete hardening in oil and must be hardened in water, with the attendant likelihood of distortion and cracking. By use of these alloy additions, these same steels may be made fully oil hardening in these same sections. A steel of given composition may consistently be made fully hardenable and in sections larger than those heretofore hardenable throughout. The ductility in the quenched and tempered state is of distinct value in such parts as gears, springs, shafts, axles and the like. The core of carburizing steels is given higher strength or greater ductility or some suitable combination of the two. Improvements in case depth and toughness also have been observed. While the functioning of these alloy additions is not yet completely understood, much work is being done and more is constantly being learned. Despite this lack of complete understanding, however, their development will benefit at least a part of those mass production articles now being made from carbon and low-alloy steels.

SINTERED POWDERED METALS HELP MAKE HIGH GRADE BEARINGS

BY C. M. HEATH
Metallurgist,
Federal-Mogul Corp., Detroit

■ ALTHOUGH the majority of friction bearings produced for combustion engines in this country are babbitt lined, there is an ever increasing tendency toward the use of stronger alloys. Use of alloys such as copper-lead, the cadmium alloys, aluminum-tin and silver-lead have been brought about largely by the tremendous increase in horsepower per engine displacement during the last 15 years. Not only have stronger alloys been developed but there have been changes made in design and construction of friction bearings to improve the bearing situation. This activity has increased immensely during the past year.

Bearings for aircraft involve one of the most pressing problems. Copper-lead is the most popular lining material for these bearings but they are quite susceptible to corrosion and do not have quite the required strength. Silver has the required strength but is erratic and prone to seize at high shaft speeds, especially under dirty conditions. Silver has been improved both by alloying and by plating the silver with lead. In the latter case, the lead plate has been treated against corrosion with indium. Both bearings are now under judgment, the latter being in actual production. It is interesting to note that some copper-lead bearings are also being treated with indium to prevent corrosion.

Various aluminum-base bearings have been made in the past but have not been used extensively in this country until recently. Now the Rolls-Royce type aluminum-tin bearings are being tried in tank and other heavy duty engines in competition with copper-lead. Trials during the past year in the automotive and tractor field tend to show that the use of thin linings, 0.002 to 0.005-inch thick, will improve the load carrying capacity and fatigue life of the bearing. Such thin linings may or may not be backed by an intermediate copper base layer.

A bearing that has recently been announced in the automotive field consists of a copper-nickel metal powder sponge sintered to a steel back and subsequently impregnated with a lead rich alloy. The total nonferrous lining is a trifle thicker than the sponge, however. It is claimed that this bearing has better fatigue properties and will carry greater loads than ordinary

lead base lined bearings. Undoubtedly, in the future many more kinds of sintered bearings will be produced, such as copper-lead.

NICKEL PLATING SPEED JUMPED 500 PER CENT IN PILOT PLANTS

BY TECHNICAL STAFF
International Nickel Co. Inc., New York

■ WITH production being stepped up throughout industry, the strong trend toward the wider uses of existing alloys and the development of new materials is now gaining tremendous strength. The nickel-copper alloy steels, for instance, are being used more and more in the transportation field, following an extensive use for drill pipe and other petroleum applications.

Activity in the aircraft industry is bringing about increased use of the high strength, low alloy, heat treated steels for such parts as tubing for engine mounts and landing gears, propeller blades, propeller shafts, propeller hubs, blade nuts, bolts, gears, connecting rods. Automotive and aviation production is adopting more nickel-chromium-molybdenum steel for stressed parts subject to intricate machining. These steels are machined after heat treatment to 450 brinell, once considered impractical.

A recent estimate gives the amount of stainless steel used thus far in 1940 by west coast airplane makers for nonstructural parts alone at 2,000,000 pounds. A large trailer company has ordered 10,000 stainless steel freight trailer bodies requiring an estimated tonnage of 18,000,000 pounds over a 3-year period.

Among the bronzes, superior materials at reasonable cost have been developed for special applications with mixtures containing from 5 to 15 per cent nickel. Some of these alloys in the "as cast" condition show a strength of 45,000 to 48,000 pounds, which can be brought up to 75,000 to 80,000 pounds per square inch upon heat treating. Bronzes of this type are not subject to changes in structure or composition under outdoor exposure, and are useful for highly stressed members of transmission line switchgears and conductor wire supports.

The extension of air conditioning to new fields including passenger automobiles involves large amounts of thermostatic bi-metals for controls which use nickel-iron alloys containing 36 to 45 per cent for the low expansion side, and 20 to 70 per cent nickel for the high expansion side.

High speed nickel plating has been carried out in pilot plants at speeds five times as fast as those now found in automobile plants, at present the widest users of nickel plating.

COPPER ALLOY STANDARDIZATION PROGRESSES RAPIDLY IN YEAR

BY H. P. CROFT
Chief Metallurgist, Cleveland Division,
Chase Brass & Copper Co. Inc., Cleveland

■ CONSIDERABLE progress has been made in the standardization of alloys in the past year in the copper industry due largely to the efforts of committees of the American Society for Testing Materials. These committees with representatives of various government branches took steps to standardize various specifications covering copper and copper alloys. At the same time some of the manufacturers made an effort to reduce the number of alloys which they produce by eliminating slight variables in composition and concentrating on alloys whose properties warrant larger consumption.

Among the high spots of the year was something of a record set by one of the manufacturers in producing 16½-foot copper circles, ⅝-inch thick. Following the lead of the steel industry, several producers adopted the use of continuously agitated pickling baths. While the continuous pickle and dryout machines in a crude form have for years been used in the finishing of annealed brass sheet, the modern units embody several noteworthy improvements, carrying the sheet through in a straight line thereby avoiding changes in temper or damage to the surface which may be encountered on the older type of machines. These units have also been adapted to cleaning between operations where heavier coils and slabs are handled.

An improved method of chemical tinning has been developed at Battelle Memorial Institute and has been described by Sullivan and Pavlish. Several papers of interest to the producers and consumers of copper alloys were presented during the past year. Heyward, Isawa and Thomas investigated the "Effect of Atmospheres During the Casting and Melting of Copper," covering the effects of all of the gases which might commonly be expected to be present during such operations, while another contribution on copper embrittlement was made by Wyman. Studies of the properties of brasses included work on damping capacity by Norton and methods of determining specific and latent heats by C. S. Smith.

MOLYBDENUM IMPORTANT ELEMENT IN NEW AIRCRAFT ALLOY STEELS

BY ALVIN J. HERZIG
Chief Metallurgist,
Climax Molybdenum Co., New York

■ DOMESTIC consumption of molybdenum is expected to reach a new all-time high for the current year. The continued rise in the molybdenum consumption curve may be attributed to many factors, including heavy production of motor vehicles, intensive activity by the oil industry, unprecedented booking of orders for machine tools and skyrocketing of aircraft production. While the national defense program has also been a factor, the direct demand for molybdenum in ordnance materials has not yet bulked as large as popular opinion would lead us to believe.

In the motor industry, the tonnage of carbon-molybdenum steel consumed has increased. Progress has also been made toward developing nonstrategic steels, so-called, in which manganese is partially replaced by molybdenum. This development seems destined to continue and will be accelerated if manganese prices should advance.

As might be expected, aircraft developments have been noteworthy. A chromium-molybdenum-nickel nitriding steel containing 1 per cent molybdenum but no aluminum is now being specified by both American and British manufacturers. A steel containing 2 per cent chromium, 0.50 per cent molybdenum has been tried with success for air-hardened cylinder liners for aircraft. Another new aircraft steel containing 3 per cent chromium and molybdenum, introduced into this country from England, has been well received. A typical application is crankshafts.

Other newsworthy steel developments might include the use of 3 per cent molybdenum, 0.15 per cent carbon steel for molds, and further development and acceptance of a flame-hardened copper-manganese-molybdenum die steel that can be hardened in position to eliminate the use of inserts in certain forming dies.

Molybdenum high speed steels have received increased attention during the past year and these steels may be expected to assume even more importance if a tungsten shortage should develop. A comparatively new 5 per cent chromium-molybdenum air-hardening die steel that is economical to use on fairly short runs has gained considerable popularity during the current year. A steel with similar chromium content and 1½ per cent molybdenum has given an excellent account of itself in die-casting dies. The use of molybdenum to promote adequate depth hardening in many steels, and particularly in die steels, now appears to be well established as a trend.

In addition to its use as a component in iron and steel,

significant developments have been reported in the use of a molybdenum compound (MoO_3) as an adherence promoting agent in ground coats for enamels.

POWDERED METAL DEVELOPMENTS CONTINUE, BUT AT SLOWER PACE

BY W. B. SCOTT
Metallurgist,
Ampco Metal Inc., Milwaukee

■ THE TONNAGE of powdered metals used in porous bearing manufacture for 1940 has to date shown little increase over the previous years' production. Heralded new developments, such as the thin, composite, steel-backed bearing, have both added to and subtracted from the applications for this type of material. The manufacturers of molded parts have shown new ingenuity in mold design and press construction. Technically, there is still a lot to be learned as to the effect of particle size distribution and the effect of minor impurities.

The use of iron powder is making slow progress. One reason is the technical difficulties involved in producing desired characteristics, such as compressibility. A second reason is the difficulties encountered in using iron instead of copper without modification of the dies now ready for production. There is much to be done in developing a die material that will resist the abrasive action of iron powder.

The wide field for the use of powdered iron in electrical applications has not been fully exploited, largely because there is not yet a sufficiently pure iron at a price low enough to warrant any research. An iron powder of 96 per cent iron maximum is being quoted at approximately 10 cents per pound. No "five-cent iron" is in sight. However, should one producer make good his claims on a 50-ton per day pilot plant, the price situation may change radically.

The position of powdered copper and iron, relative to the national defense program, is interesting. One plant, normally producing about one-third of the nation's powdered copper, now finds much of its equipment busy on secondary material such as copper oxide, important on government orders.

The defense program is giving the call to fully established materials with proven records for durability and shock resistance under actual service conditions. In other fields, the press of production is such that the research required for powdered metal development is being shelved for the time being. From this standpoint, the growth of the powdered metal industry should continue much as it has in the past year without any direct impetus from the present defense activity.

EXTRUSION OF METAL POWDERS IS ADVANCED BY NEW TECHNIQUE

BY ROBERT H. LEACH
Vice President,
Handy & Harman, Bridgeport, Conn.

■ DURING the past year there has been an increase in the use of metal powders for the manufacture of different products such as bearings, cemented-carbide products for tools and dies, electrical contacts and small pressed parts made from both ferrous and nonferrous metals. There also has been a considerable amount of research and development in the production of metal powders and methods of using them. Courses of instruction are being given in some of our universities and the field of powder metallurgy has become sufficiently extensive to justify its being given some attention by any school which attempts to give its students a well-grounded course in metallurgy.

An important development in the use of powdered metals in the manufacture of bearings is the application of a thin strongly bonded porous layer of a suitable combination of powdered metals to a steel strip. The babbitt then is applied to this porous matrix to give a strong mechanical and chemical bond.

Extrusion methods have been given considerable attention in powdered metallurgy. Although the extrusion of metal powders is not new, improved technique has made it possible for the Carboloy Co. to produce carboloy rods, spirals and tubes by this process. Extrusion removes some of the difficulties and limitations of the usual methods which entail the use of steel dies and high pressures. Further investigation of the extrusion process as applied to powdered metallurgy appears to be justified.

With the enormous expenditure which is contemplated for the production of airplanes and armament, carbide tools become of increasing importance. It is encouraging to note that reduction in prices on these tools have been made recently and even more important is the fact that prominent producers have provided new plant and equipment to meet the probable demands.

COMPOSITE TUBING HELPS SOLVE DUAL-LIQUID CORROSION PROBLEMS

BY DR. ALAN MORRIS
Chief Metallurgist,
Bridgeport Brass Co., Bridgeport, Conn.

■ IN COPPER metallurgy, corrosion still remains one of the most frequently recurring problems. In the field of heat exchanger tubing, particularly in oil refineries and in the chemical industries, interesting uses have been found for composite tubing made of two tubes of different metals or alloys, drawn together, one inside the other. Such tubing finds a use where the corrosive conditions inside and outside the tube are different and of such a nature that no one metal or alloy can successfully withstand both.

There has been an increase in the use of copper base alloys containing aluminum. Some of these have found new uses because of their relatively good corrosion resistance, high strength, ease of hot working and good machinability. Work on various methods of continuous casting has been carried forward, though at present there are relatively few instances of commercial use.

The national defense program is still too young to have resulted in new developments. However, the past year has seen improvement in processing in the production of defense material.

ALUMINUM ALLOY BEARINGS OFFER HIGH RESISTANCE TO FATIGUE

BY E. H. DIX JR.
Chief Metallurgist,
Aluminum Research Laboratories,
Aluminum Co. of America, New Kensington, Pa.

■ SINCE THE demand for aluminum has steadily increased in the past few years, plant enlargements and improvements have been the order of the day and technical activities have been directed more toward improvements in existing products or processes rather than the development of new alloys. As a result of these efforts, and the increased volume of business, the price of primary metal has been reduced twice during the past year and now is at the lowest level in history. Several of the alloys developed in the past few years have continued to grow in popularity, so their production has attained substantial tonnages.

Although a considerable amount of fabricated aluminum has gone toward war and defense requirements, many new applications have been developed while most of the older ones have consumed larger quantities of material. Five more aluminum streamliners are helping the railroads to improve their service while some 2000 aluminized busses have been placed in local and intercity service.

Aluminum alloy bearings have perhaps been the most novel development of the past year. These bearings are, as yet, in an experimental stage in this country

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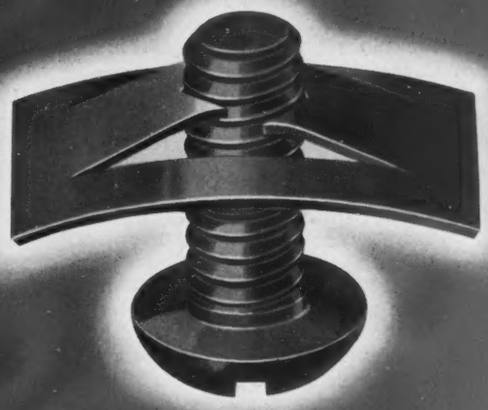

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but the results have been very encouraging. The bearings, of one-layer construction, have proved highly resistant to fatigue and corrosion and have performed well on hardened steel shafts under high bearing pressures in bus, truck and airplane motors.

Furnace, dip and torch brazing processes for aluminum alloys have been further developed and improved during the year. In addition, several important commercial applications of the process, notably the assembly of outboard motor gasoline tanks and of refrigerator evaporator units, have attained production success.

Plant enlargements and additions by the Aluminum Co. of America included new sheet mills at Alcoa, Tenn.; Edgewater, N. J.; and New Kensington, Pa.; extrusion equipment at Lafayette, Ind. and Los Angeles; forging equipment in Cleveland and Los Angeles, and a new reduction plant at Vancouver, Wash. The construction of two new power dams recently was begun to further augment the reduction facilities in this country.

ELECTROLYTIC MANGANESE ALLOYS GET GOOD COMMERCIAL START

BY R. S. DEAN
Chief Engineer,
Metallurgical Division, Bureau of Mines
Department of the Interior, Washington, D. C.

■ MANGANESE alloys made with electrolytic manganese have passed from the stage of purely laboratory investigation to commercial trial for a number of important uses. The favored alloys are those having unusually high damping capacity typified by the 82½ per cent manganese; 17½ per cent copper alloy; the alloys of manganese, copper and nickel (about 75 per cent manganese) having high coefficient of expansion; the hardenable alloys of manganese, copper and nickel (for example, 40 per cent copper, 30 per cent manganese 30 per cent nickel); and alloys high in zinc (60 to 70 per cent zinc) which possess unusual hardness and strength for hot pressing alloys.

The high-vibration-damping alloys have been successfully fabricated in substantially all shapes and sizes from 0.004-inch wire to gear blanks of a hundred pounds or so. They are being tried for reducing noise and vibration in all kinds of mechanisms. Problems of welding, sand casting, and heat treatment and the behavior of the alloys under service conditions are engaging those who are studying the other alloys.

The stainless hardenable alloys of iron-chromium-manganese have been satisfactorily fabricated into a variety of shapes and are being tested for actual use. Investigations of the structure and properties of all of the manganese alloys are proceeding in a number of laboratories. Another year should see several of these alloys in production and a permanent market provided for electrolytic manganese.

Above are personal views of the writer, not official statements.

DIECASTING PROGRESS RESULT OF MORE KNOWLEDGE OF FINISHES

BY R. E. KELLERS
Market Development Division,
New Jersey Zinc Co., New York

■ PROBABLY the most accurate barometer of diecasting progress is the exhibit of castings sponsored by the New Jersey Zinc Co. at each year's national metal exposition. These zinc alloy die castings are culled from the previous 12 months' production of the commercial diecasters throughout the country. They represent either new fields of application of new developments in diecasting design and production.

In gathering material for the 1940 exhibit it became immediately apparent that the diecasters had a "bumper crop" of new applications. One of the reasons behind the continued penetration of diecastings into new fields is the better understanding of available organic and plated finishes—and how to apply them. Recent impartial tests thoroughly confirm the fact that the life of plated finishes depends on the specification of the proper coating thickness for each specific service requirement. When the correct organic or plated coating is selected and the casting is properly prepared to receive the finish, performance will be satisfactory.

LEAD-BEARING STEEL MACHINING SPEEDS IMPORTANT IN DEFENSE

BY DR. OSCAR E. HARDER
Assistant Director,
Battelle Memorial Institute, Columbus, O.

■ DEVELOPMENTS by Inland Steel Co. of lead-bearing steels of improved machinability during work sponsored at Battelle Memorial Institute has been described in technical literature. There are, however, certain features which characterize the lead-bearing steels of improved machinability which may be of special interest.

The most unique features of improving the machinability of steels by the addition of lead are that the improved machinability can be effected without loss in mechanical properties such as strength, elongation, reduction of area, impact resistance and fatigue endurance, and without change in hardenability characteristics. Research has shown that the above statement holds for plain carbon and also heat and corrosion resisting steels.

The production of lead-bearing steel was limited in 1938, the total amounting to about 10,000 net tons. By the end of 1939 the total production in this country had reached about 60,000 tons. The production abroad probably added enough to bring the word total up to about 100,000 tons. In the last quarter of 1939, the production in this country was about 25,000 tons. This was almost entirely limited to plain carbon steels and mostly in the low and medium carbon grades. There has been relatively little production in the SAE alloy grades in this country although there has been considerable production in similar grades abroad. One steel mill in this country has received a recent foreign order for 8000 tons of lead-bearing steel. The production of lead-bearing steel in this country is not limited to a single company, but it is produced by companies representing about 75 per cent of the total steel producing capacity.

Depending upon the particular application and the machine setup, the increased output from machines utilizing lead-bearing steel stock has ranged all the way from 10 up to values over 100 per cent. Tool life also is increased. To get maximum returns for the lead-bearing steels, it is necessary to have machines which will run at high speeds and high feeds.

From the national defense point of view, lead-bearing steels are unique in offering the improved machinability in shells which require certain mechanical properties for bursting characteristics because lead can be used to improve the machinability without changing the mechanical properties.

There is another advantage of lead-bearing steels in that the addition of lead is generally additive over the effect of other elements which are used to improve machinability, such as sulfur, increased phosphorus, etc.

NEW TUNGSTEN-CHROMIUM-COBALT ALLOY CUTTERS RESIST CHIPPING

BY DR. W. R. FRAZER
Chief Metallurgist,
Union Twist Drill Co., Athol, Mass.

■ THERE HAS been continued effort on the part of tool manufacturers to improve the quality of their product by co-operation with tool steel manufacturers in an effort to produce more uniform steel, both chemically and physically. Also constant control over the heat

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treatment of the tools is receiving increased attention.

No appreciable change has been made in the analysis of tungsten type (18-4-1) high-speed steel although most mills are keeping to the high side of the vanadium specification to effect greater hardenability. There has been an increase in the use of 2 per cent vanadium and 8 per cent cobalt high speed for machining heat-treated alloy steels. Regarding the molybdenum type high-speed steels, there is still considerable experimental effort to develop a steel that will harden in a fuel fired or electric furnace without softening at surface. Several grades have been produced which show promise in this direction, so a shortage of tungsten would not seriously affect our high-speed steel production.

Improvements have been made in the heat treatment of tools by a careful study of the effect of the furnace atmosphere on rate of heating and grain refinement. All modern hardening furnaces are equipped with accurate temperature controllers and timers so a record is kept of the treatment given the tool. This makes duplication possible. As a result of these refinements in hardening procedure, modern high-speed tools exhibit greater tough-hardness and cutting ability than ever before. There are some applications particularly in machining nonferrous materials, where a nitrided surface on high-speed tools helps minimize abrasive wear. However, this treatment is not universally successful.

There has been continued use and development of sintered carbides. They have proved very successful in many instances. One of their limitations has been caused by chipping when milling heat-treated steel. A new development has been a cast high-alloy material containing large percentages of tungsten, chromium and cobalt. This material is used at speeds intermediate between those for high-speed steel and carbide tools. It seems to have the toughness to resist chipping even under heavy feeds and impact loading, and is well adapted for inserted-tooth milling cutters.

FORGING INDUSTRY HAS SHORTAGE OF EQUIPMENT AND TRAINED MEN

BY EUGENE C. CLARKE
President,
Chambersburg Engineering Co., Chambersburg, Pa.

■ THE ADAPTATION of American forging practice by almost every industrial nation in the world and the concentration of that practice in the making of armament overshadows any progress made in the past year. This conclusion seems inevitable as one considers the defense program for 1941 thus far published, as compared with the available equipment and man power to furnish the myriad of vital forged parts required in that program.

In the drop forging field, an estimate of output needed in 1941 for defense projects discussed prior to September can be summarized as equivalent to nearly 50 per cent of the total industry production for the year 1939 as reported by the Drop Forging association. The addition of some 150,000 tons of net weight, representing approximately 2,000,000 man hours of production to a year reported as 93 per cent of normal, discloses the serious need for equipment and trained men.

In the pressed and drawn forging field, upon which the supply of shell forgings, cartridge cases, bombs, etc., depends, there is an even greater shortage of equipment and men for normal commercial use of similar products is limited. If 1941 needs are considered as 50,000 tons of such forgings—which seems conservative as one reads of the daily consumption in the current war—there is a recognized need for several hundred machines which do not exist and for some 6,000,000 man hours not yet trained.

Consideration of heavier forgings, hammered and pressed, as required for guns, tanks, ships and so on, easily adds another 150,000 tons to the 1941 requirements known to date. Again there is a dearth of equipment not as serious numerically as some of the other shortages, but more serious as regards to time, for the required equipment is massive and intricate and not susceptible to speedy manufacture.

When the military demand for no less than 350,000 tons of forgings is superimposed on an increased and equally important commercial demand, the need to speed preparation to supply the equipment and train personnel is obvious. However, speed should not permit a sacrifice of the gains made in more accurate, closer-tolerance forgings.

The figures used in the above estimates are net weights of forgings and probably represent approximately 440,000 tons of forging stock. If closer-tolerance forgings were to save but 5 per cent in the year 1941, the economies would be 22,000 tons of forging stock, plus some 200,000 actual machining hours, plus approximately 2,000,000 horsepower hours, all adding up to a sum commanding respect.

PRECISE INSTRUMENTS GREATLY AID MACHINE TOOL PRODUCTION

BY ALFRED KULLMAN
Assistant Works Manager,
American Tool Works Co., Cincinnati

■ ALONG WITH the thousands of jigs and fixtures involved in making machine tools for defense projects (the average machine tool has 750 to 1000 parts) the use of instruments of many descriptions has been imperative. Amplifying instruments are required for the basic gaging system involving the checking of reference sets of block gages to 0.00002-inch against master gages, accurate to five millionths, and on down to the checking of working gages held to 0.0002-inch. Similar instruments are used to inspect lead screws and many parts which carry a total tolerance of 0.0002-inch.

The foundation of any machine tool is its bed. Unless it is true, an accurate machine cannot be constructed, so beds are leveled with precision instruments graduated to 0.0005-inch per foot. In the case of a long lathe bed straightness of the ways in a horizontal plane is checked by means of a piano wire and a microscope calibrated in 0.001-inch. The head stocks, tail stocks and carriages can be aligned accurately using indicators. During World War I, a 20-inch lathe transmitted a maximum of 7½ horsepower with eight geared speed changes. A modern lathe of the same size may transmit the overload capacity of a 20-horsepower motor with 27 speed changes and spindle speeds up to 1600 revolutions per minute. Amazingly, the cubic measurement of the gear set remains approximately the same, made possible by use of accurately hardened alloy steel gears, shafts and spindles. This heat treating, too, involves use of many instruments for precise control.

Today's practice of nitriding steel, for radial drill spindles and sleeves as an example, with its 48-hour cycle would be impossible without modern pyrometry.

STEEL CASTING INDUSTRY EXPANDS USE OF NONDESTRUCTIVE TESTING

BY CHARLES W. BRIGGS
Technical Adviser,
Steel Founders' Society of America, Cleveland

■ ONE OF the most interesting developments in the steel casting industry, particularly in the light of the country's rearmament program, is the extensive use of nondestructive testing methods. A large number of foundries are equipped to carry on nondestructive inspection, and many foundries doing government work have made nondestructive testing a part of their daily routine. A considerable number of steel foundries are using gamma ray radiography at the present time for inspection and for studies of casting technique. Radium is more popular than X-ray as an energy source.

The Navy has recently advised that radiographic ex-

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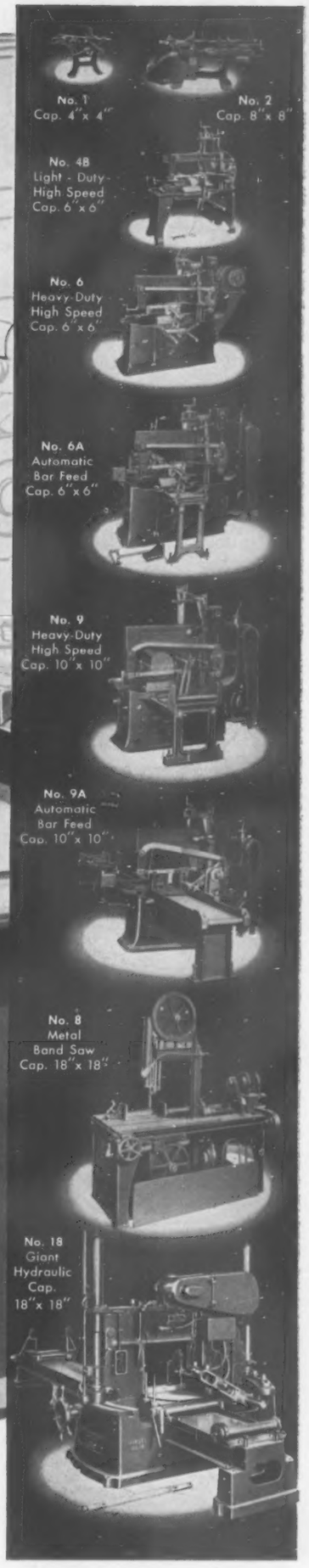
They set new standards for fast cutting-off with accuracy and low cost per piece, whether cutting off thin slices (as for gear blanks) or long lengths (like rifle barrels).

These high speed "automatic" saws come in two sizes: The MARVEL No. 6A, Capacity 6″x6″, and the MARVEL No. 9A, Capacity 10″x10″. With the other MARVEL Saws, they comprise the most complete line of sawing machines built—a line that provides exactly suited saws for every purpose.



MARVEL SAWS

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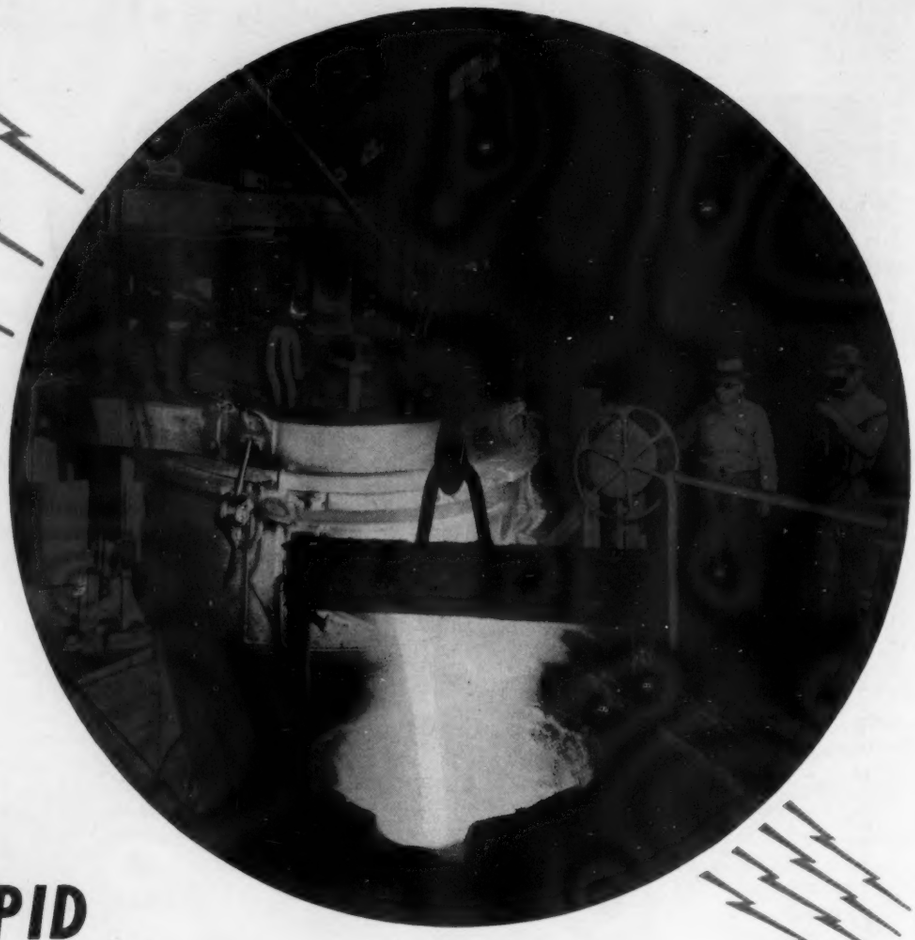
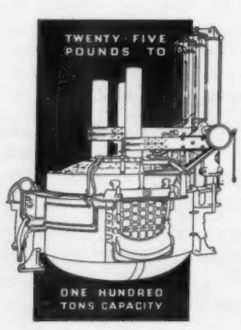


MOORE RAPID *Lectromelt* FURNACES

TOP CHARGE AND DOOR CHARGE TYPES

LECTROMELT furnaces are extensively used in rolling mills and foundries for the production of plain carbon and alloy steel ingots and castings. With the top charge type LECTROMELT furnace there are savings in power, electrodes, refractories and man hours. Furnaces for machine charging and chute charging are also available.

LECTROMELT furnaces are ruggedly built to give long service with low maintenance and with rapidity and economy of operation. LECTROMELT furnaces are available in standard capacities from 25 pounds to 100 tons.



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'LECTROMELT FURNACES OF CANADA, LIMITED
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Associate British Company
BIRMINGHAM ELECTRIC FURNACES, LIMITED
Birmingham, England

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNSYLVANIA

amination was being extended to all steel castings for main propulsion turbine castings, main steam chests, main steam line fittings and main steam valves. Also, radiographic examination is being given to principal ship castings such as stems, stern posts, struts, rudder castings, stern tubes, turret roller path castings and other castings subjected to shock.

A number of steel foundries have qualified or are qualifying under the ballistic test requirements of both the navy and the army for armor plate castings. Experimental orders on the casting of shells are also being considered.

Much thought, study and experimentation is being given to applying alloyed cast steels in the quenched and tempered condition for use in high strength structures which require considerable toughness. Also, the use of the centrifugal process for steel castings has progressed as far as the number of foundries equipped to handle this type of work is concerned. A greater number of pattern designs are being adapted for production by this process.

Cast-weld construction and composite construction seem to be retaining their popularity and these forms of construction will undoubtedly be further developed under the rearmament program.

Much consideration has been given to steel casting design during the year, and fundamental rules are being placed before the designing engineer for his use. Steel Founders' Society of America is very active in this regard, having just completed a sound slide-film on "The Designing of Steel Castings," and a steel castings handbook. Film illustrates many ordinary and special design problems, while the handbook presents considerable information on the mechanical and physical properties, the manufacture, heat treatment, design and uses of carbon and alloy cast steels.

PRECISE CONTROL POSSIBLE GIVES INDUCTION HARDENING BIG BOOST

BY JOHN F. WYZALEK
Chief Metallurgist,
Hyatt Bearings Division,
General Motors Corp., Harrison, N. J.

■ ADVANCES in steel manufacture, treatment methods and treating equipment are impressive as one views the past year's accomplishments in metallurgy. Improvement of steel quality has been made possible through development of compounded additions of vanadium, titanium and aluminum; silicon, aluminum, vanadium and zirconium; calcium, manganese and silicon. These reduce oxides and gases in steel and promote finer grain size. Also, addition of zirconium, fixing oxygen and nitrogen, tends to eliminate age hardening in sheets with resulting high strength and ductility conducive to cold forming, coining and deep drawing. Phosphorus additions up to 0.20 per cent in low-alloy high-strength steels have improved tensile values and increased resistance to atmospheric corrosion. Resulphurized alloy steels have improved machinability. Silver additions to 18-8 stainless steel improved machinability and resistance to pit corrosion.

More extensive application of gaseous media for carburizing of steels has been noted. With accurate control of gas constituents, dilution of hydrocarbon gases and recirculation of spent gases, a surface free of soot has been accomplished, so important for unground parts requiring dimensional accuracy, such as gears. Also, mechanical agitation of carburizing gases has come into greater usage, promoting uniform carburization even in densely loaded charges.

Production of shallow depth case has been greatly facilitated through increased usage of gaseous atmospheres to replace cyanide and similar salt case-hardening methods. Mixtures of hydrocarbon and ammonia gases produce hard surfaces with and without quenching with accelerated rate of penetration. Austempering is gradually but surely making commercial progress. Principle of delayed quenching through use of heated media offers very high ductility in hardness ranges normally brittle when treated conventionally.

Increased commercial activity in induction hardening of internal and external surfaces of steel parts has taken place. Important advantage of this process is the extremely precise control of both area and depth treated. In simple or intricate parts, the shape and depth of the hardened zone is varied at will with split-second heating and quenching cycles and minimum distortion, decarburization and surface oxidation.

Recent developments in protective gas atmospheres have vastly improved heat treating operations. Mixture of nitrogen and hydrogen is latest development for protection of high-alloy tool steel and for furnace brazing stainless and high-chromium tool steel. The radiant tube principle of furnace gas heating has come into more extensive usage, eliminating need of heat resisting alloy muffles. Through confinement of fuel gases within the radiant tubes, furnace atmospheres are maintained as desired with lower overall operating cost.

TUBE CONTACTORS OFFER MEANS OF IMPROVING PROCESS CONTROL

BY C. F. WITTLINGER
Process Engineer,
Delco Products Division,
General Motors Corp., Dayton, O.

■ HARDLY a year passes but what we are confronted with the selection and installation of at least one furnace of fair size. Each time one of the earliest decisions to be made is that between electric or gas fuel. In this locality the operating cost of a gas fired furnace holds a slight advantage over electric but not enough to compel its use if other advantages outweigh this economy. In processing large schedules of say, an automotive part, one of the most difficult problems is that of being sure that no single part will be produced without being heat treated to exact specifications. Many times the part is relatively small and while a few bad parts per day may be only a thousandth part of one per cent, it is of tremendous concern if they should slip past. On the other hand a 100 per cent inspection might double or triple the cost of the part.

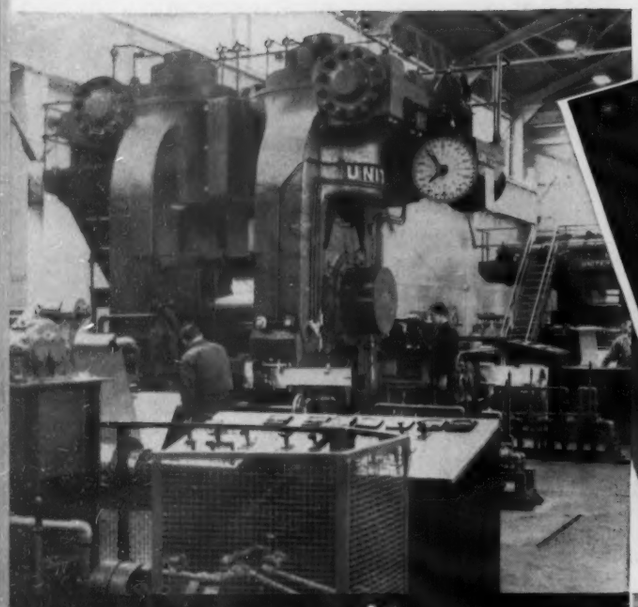
The only solution is a controlled material processed in the best of equipment that is under control to the same degree of exact limits that has been acquired in the machining of the product. This enables sample after sample to be checked with always the same consistent result, comfortably on the safe side.

Contactor service on electric furnaces is very severe. They must have enough mass to handle the heavy current and at the same time operate with almost a snap action to make and break the load properly.

This combination of operating conditions usually results in an accelerated life test for the contactors. Increasing their ruggedness only shortens their life because of increased inertia forces. This condition was encountered once before in the manufacturing industry when resistance welding came to the front as a means of fabricating parts. In this process, especially seam welding, heavy currents had to be interrupted as frequently as 30 times per second. Mechanical contactors collapsed, and the manufacturers of these devices developed the perfect solution—a contactor having no moving parts; where the current was interrupted silently inside metal tubes of mercury vapor. Now known as Ignitron contactors, there is nothing about these units to maintain and the frequency of operation in no way affects their life.

To bring electric furnaces a step further along in this present parade of progress the instrument manufacturers must now adapt their product to take advantage of this new tool. The instrument would contain an interrupter in the control circuit piloting the ignitron

ROLLING STAINLESS



THESE MILLS ARE NOW IN DAILY PRODUCTION

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2-HIGH TEMPER PASS MILL

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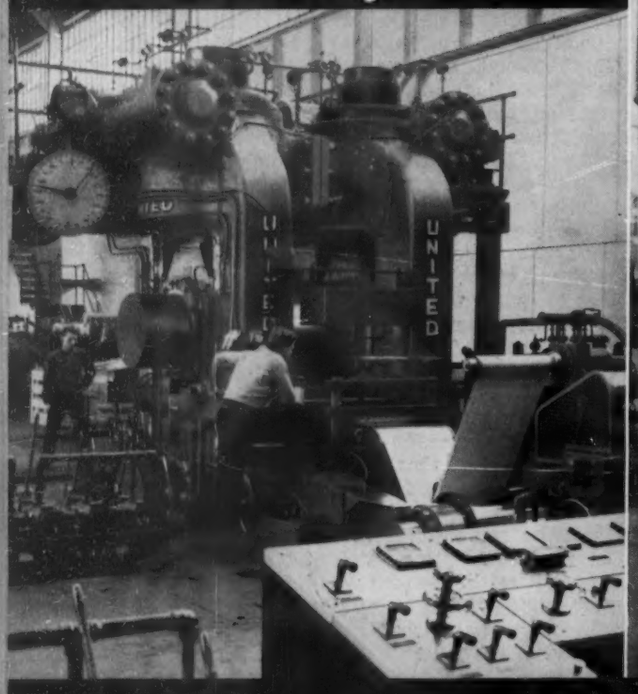

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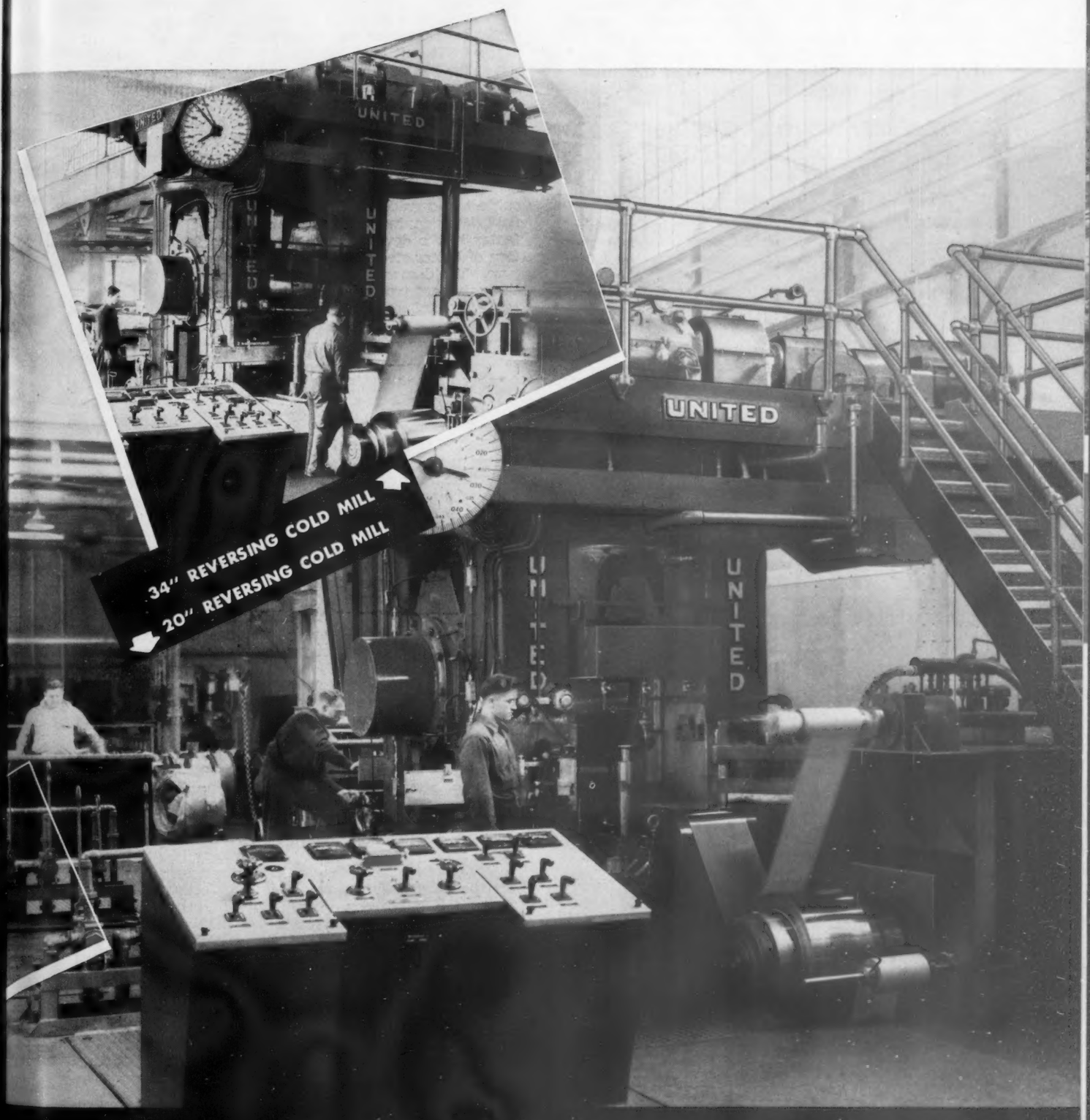


MONTREAL, P. Q. · UNITED INTERNATIONAL, S. A. PARIS, FRANCE · SHIBAURA-UNITED ENGINEERING CO., TOKYO, JAPAN

contactors. Even the expensive special transformers with their tapped secondaries could be eliminated by having the heating grids supplied directly from the power supply, and the energy input to the furnace would be controlled by the ratio of current "on time" to "off time" as determined by the instrument in response to its thermocouple. The duration of these on and off periods would be a matter of tenths of seconds and the result would be a smooth flow of energy input to the furnace to meet the exact requirements of the furnace load.

CONTROLLED ATMOSPHERE FURNACES SEEN AS AID TO REARMAMENT

BY F. O. HAMLET
Factory Metallurgist,
SKF Industries Inc., Philadelphia

■ AMONG the many recent developments in the field of production metallurgy, there is scarcely a doubt that our expanding knowledge of furnace atmospheres has been extremely important. Many producers of heat treating equipment are offering controlled atmosphere furnaces as standard production tools. These are available in both batch as well as continuous types and will undoubtedly make for lower costs in the manufacturing of a great variety of steel products.

The furnace manufacturers alone, cannot be given more than a part share of the credit, for the steel manufacturers too, have contributed no small amount. It is hardly necessary to add that such a production tool will prove invaluable to the rearmament program.

LIQUID NITRIDING GIVES WORK A HIGH SURFACE HARDNESS

BY J. G. MORRISON
Metallurgist,
Landis Machine Co., Waynesboro, Pa.

■ THE PAST year has seen extended use of 5 per cent chromium, 1 per cent molybdenum air-hardening tool steel, not only in filling the gap between the regular oil hardening and high-carbon high-chromium tool steels but often overlapping either. For certain tools the liquid nitriding of this steel at 950 degrees Fahr. appears to have some possibilities.

Progress continues to be made in the use of controlled atmospheres, particularly in connection with tool steels. A recent development embodies the entraining of lithium vapor in the atmosphere for the expressed purpose of reacting preferentially with any oxygen which may be present or which may be liberated from the oxygen bearing components of the atmosphere. The Landis Machine Co. is exploiting the liquid nitriding of Nitralloy steels for some parts requiring a high surface hardness and minimum distortion but where highly localized pressures are not encountered. A relatively short time of immersion and elimination of slow cooling produces surfaces which are resistant to full file-testing pressure and a surface hardness approaching that obtained by the ammonia process. The liquid nitriding of hardened high-speed steel is extending to tools and dies where resistance to abrasion is required. Some cold-forming dies, lathe centers, gages and so on made of high-speed steel have shown considerable improvement in life after nitriding.

SMALL PIT-TYPE CARBURIZING FURNACES HAVE LARGE OUTPUT

BY L. A. LANNING
Assistant Plant Manager,
New Departure Division,
General Motors Corp., Bristol, Conn.

■ HIGH FREQUENCY heating for treating steel has been widened in a direction that promises to be important—the development of small processing units for the localized treatment of relatively small parts. This innovation appears to have wide possibilities for manufacturers who must heat treat small parts on a production basis.

The fairly recent development of a new type of construction of gas carburizing furnaces whereby the usual alloy muffle is eliminated promises to provide economies through a decrease in maintenance costs and appears to represent an import refinement of an old process. It will bear watching in the future. Carburizing also has experienced a marked trend toward relatively small pit type units employing liquid or gas as the carburizing medium. While relatively small in size, these furnaces have a surprisingly large output with low operating cost and great flexibility.

The exacting requirements of the expanding aircraft industry has broadened the use of the magnaflux inspection greatly. While this method of inspection is subject to considerable controversy in the metallurgical field, its widening use has without doubt been a large factor in the development of processes for the production of better steels and will continue to be so in the future. The demand for uniformity in physical properties through heat treatment has introduced into inspection methods hardenability tests which prove of much value.

WAR DEMANDS MAY SHORTLY BE A FACTOR IN PROCESS SELECTION

BY ARTHUR E. FOCKE
Research Metallurgist,
Diamond Chain & Mfg. Co., Indianapolis

■ FOR MANY of us, the direction which developments in the uses, processing and heat treatment of metals may take during the next year will depend upon the way the rearmament program develops. The three criteria for materials or processes are quality, cost, and delivery. In the case of actual war, delivery is the first consideration, cost is least important and quality is restricted to the minimum that will permit the part to function. During peace times, delivery is usually the least important; quality, cost balanced to meet competition.

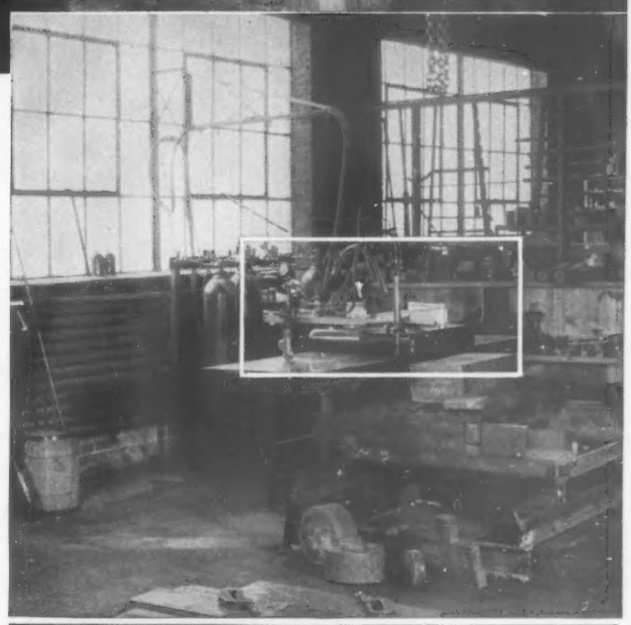
The present situation represents an intermediate phase in which all three criteria are of about equal importance with possibly somewhat less interest in cost and more emphasis on delivery but with quality held to peace time standards. The necessity of providing high quality parts in the shortest length of time presents a challenge which must be met. Many processes which in normal peace times are not economic but which might permit faster operation must now be reconsidered. Suppose two methods result in the same speed of operation and quality but one required an elaborate piece of mechanism not immediately available while the other method can be carried out at once on a simple improvised setup. The latter may be given preference even though costs may be greater.

For example, it is debatable whether parts and tools can be hardened free from scale, objectionable decarburization or carbon pickup better in furnaces with special prepared atmospheres or in liquid baths. In normal peace times, the relatively high salt cost and the limited life of the container for the high temperatures required for high speed steel generally has tended to give the preference to the controlled atmosphere furnaces. However, if delivery becomes most important, the simple equipment required for the salt bath as compared with the more elaborate furnace and gas preparation units might make it possible to get out production by the salt bath method before a new controlled atmosphere furnace could be built or delivered.

While it may be possible for us to continue past developments aimed at improving the quality and simultaneously keeping the same or actually reducing the cost, it is equally possible that we may be required to shift our interest and give most if not all of our attention to the problems of faster delivery.

SEE THE AIRCO No. 10 PLANOGRAPH IN *Action*

at the
NATIONAL METAL EXPOSITION
CLEVELAND PUBLIC AUDITORIUM
Oct. 21-25



The No. 10 Planograph, one of an extensive line of gas cutting machines being widely used in America's National Defense program, will be the feature of Airco's display of the Metal Show. Already gaining wide acclaim because of its outstanding performance, this Planograph cuts straight lines, rectangles, circles, irregular shapes, etc. quickly and economically from ferrous metal of any thickness within the present practical limits of the cutting torch. A minimum of floor space is needed as the illustration to the right shows so well.

This is your opportunity to see the No. 10 Planograph in action . . . at Booth G-20, the Metal Show.

The Nos. 4 and 10 Radiagraphs will be demonstrated—also on display will be the latest attachments on these machines, the most recently developed apparatus for plate edge preparation, for manual grooving, for welding, cutting and brazing.

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BALANCED 18-8 STAINLESS STEEL —A METALLURGICAL ACHIEVEMENT

BY W. J. PRIESTLEY
Vice President,
Electro Metallurgical Co., New York

■ THERE HAVE been several notable advances in metallurgy during past year. Outstanding in the field of alloy steels is the development of a heat-treating procedure for 18-8 cold-worked chromium-nickel austenitic steels. It produces a substantial and uniform improvement in elastic properties and enhances their suitability for structural use where strength together with light-weight is important. This treatment consists in heating the steel for a suitable period at a temperature below 600 degrees Fahr. and then air cooling. While usual low-temperature heat treatments that improve tensile properties result in lowered ductility, this new treatment which improves elastic properties does not lower tensile strength, or impair ductility, impact toughness or corrosion resistance.

Proper balancing the composition of chromium-nickel austenitic steels containing molybdenum and columbium or titanium to avoid impairment of physical properties or corrosion-resisting characteristics also has been achieved during the past year. Molybdenum added to stainless improves corrosion resistance. Columbium or titanium is added to this type of steel primarily to eliminate susceptibility to intergranular attack. It would appear that addition of both alloys would combine both these desired characteristics. However, addition of these ferrite-forming elements gives a structure so unstable that the maximum benefits of each element are not obtained. Proper balancing these elements to produce a stable structure with optimum physical properties and corrosion resistance as now achieved is a notable metalluurgical contribution.

Another development utilized commercially rather extensively in the last year has to do with increased amounts of manganese in austenitic stainless steels. Most notable is the improvement in hot ductility that results—quite important in welding and hot working these steels.

Another new development is the use of 3 per cent chromium, 0.5 per cent molybdenum steels in pressure vessels and other engineering applications. It remains particularly free from embrittlement in hydrogenation and other chemical service. In addition, it has excellent resistance to wear and abrasion.

SUBSTITUTE FOR SWEDISH RODS AND WIRE IS PERFECTED HERE

BY J. K. BEESON
Assistant General Sales Manager,
Pittsburgh Steel Co., Pittsburgh,
President, Wire Association

■ THE YEAR has seen certain significant developments in the fabrication of ferrous and alloy wires, which indicate that the industry is maintaining its progressive attitude toward new processes and expanded uses for wire. One of the most interesting developments is the perfection of a substitute for Swedish rods and wire. The war in Europe having seriously disrupted the supply of this necessary commodity, domestic mills have done work that has more than come up to expectations. This domestic Swedish substitute will, of course, be invaluable in automotive and spring manufacturers' operations.

Use of stainless steel wire has increased considerably, and has received further impetus by widespread adoption in refrigerator racks. It is now not difficult to visualize the day when stainless steel wire will be an important part of our national production. New manufacturing refinements have been installed, and the trend is toward more efficient methods of handling, such as straight line cleaning, flash baking, continuous wire-drawing machines and automatic bundling machines. Electric patenting furnaces are finding increased uses.

It is obvious the national defense program will stimulate the wire industry toward further technical advances and will provide a backlog for operations that will provide employment for many. The army, navy and air force are working on many new defense measures involving wire, such as various traps and nets. The army signal corps will need thousands of miles of its various wire specifications for communication work. In an effort to be of service to members of the wire industry, the wire association has set up an emergency advisory committee, the purpose of which is to act as a clearing house for questions bearing on technical problems involving United States army, navy and air force specifications.

BETTER SURFACE FINISHES CUT WEAR AND FATIGUE FAILURES

BY S. L. WIDRIG
Metallurgist,
Spicer Mfg. Corp., Toledo, O.

■ IT IS interesting to note some of the results being obtained from the constant demand for increased physical properties and longer life of steel parts for the automotive industry. Considerable improvement has been made in steel, not necessarily by increasing alloy content but by better refinement of mill operations and closer co-operation and understanding of requirements between the mill and the manufacturer. The trend has been toward the use of the so-called simpler steels. It has been demonstrated that the simpler steels, if properly applied, often may be used sccessfully where formerly it was considered necessary to use higher alloys.

For certain parts such as transmission or differential gears, the steel must machine satisfactorily at high speeds. Fully as important is the necessity of a smooth surface finish. Poor finish on gear teeth will usually result in noise, excessive wear and early failure.

For higher factors of safety, greater effort is being made to improve the surface of highly stressed steel members as surface imperfections often have great influence on durability. Research has recently developed new practical methods of fine grinding, honing and lapping for the production of smooth mirror finishes. The importance of surface quality on durability of moving parts subjected to wear and fatigue is emphasized by adoption of exhaustive lapping and polishing methods on engine parts in the aircraft industry.

Chemical coatings applied to reduce wear and scuffing also have proved successful. Various surface treatments such as cold rolling and shot blasting at points of concentrated stress in many cases have materially increased endurance limits.

Surface chemistry of the steel itself has proved extremely important when best physicals are required. Atmosphere control during the hardening of certain finish machined parts is essential since often it is desirable to increase carbon or prevent decarburization. Photoelastic equipment is proving a considerable aid in increasing physical properties. Since a picture is more impressive than a story, seeing localized stresses in a weak portion makes it easier to improve the design.

VERTICAL SPINNING WHILE FLAME HARDENING PREVENTS DISTORTION

BY R. L. ROLF
Metallurgical Engineer,
Lakeside Steel Improvement Co., Cleveland

■ SLOWLY but surely the heat treating industry is turning from the furnace method of heat treatment to the more rapid mechanical applications of induction heating and the oxyacetylene flame. The year has witnessed many new and remarkable achievements in flame

Main office and factory of The Cleveland Crane & Engineering Co., Wickliffe, Ohio

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EACH A LEADER IN ITS FIELD

3

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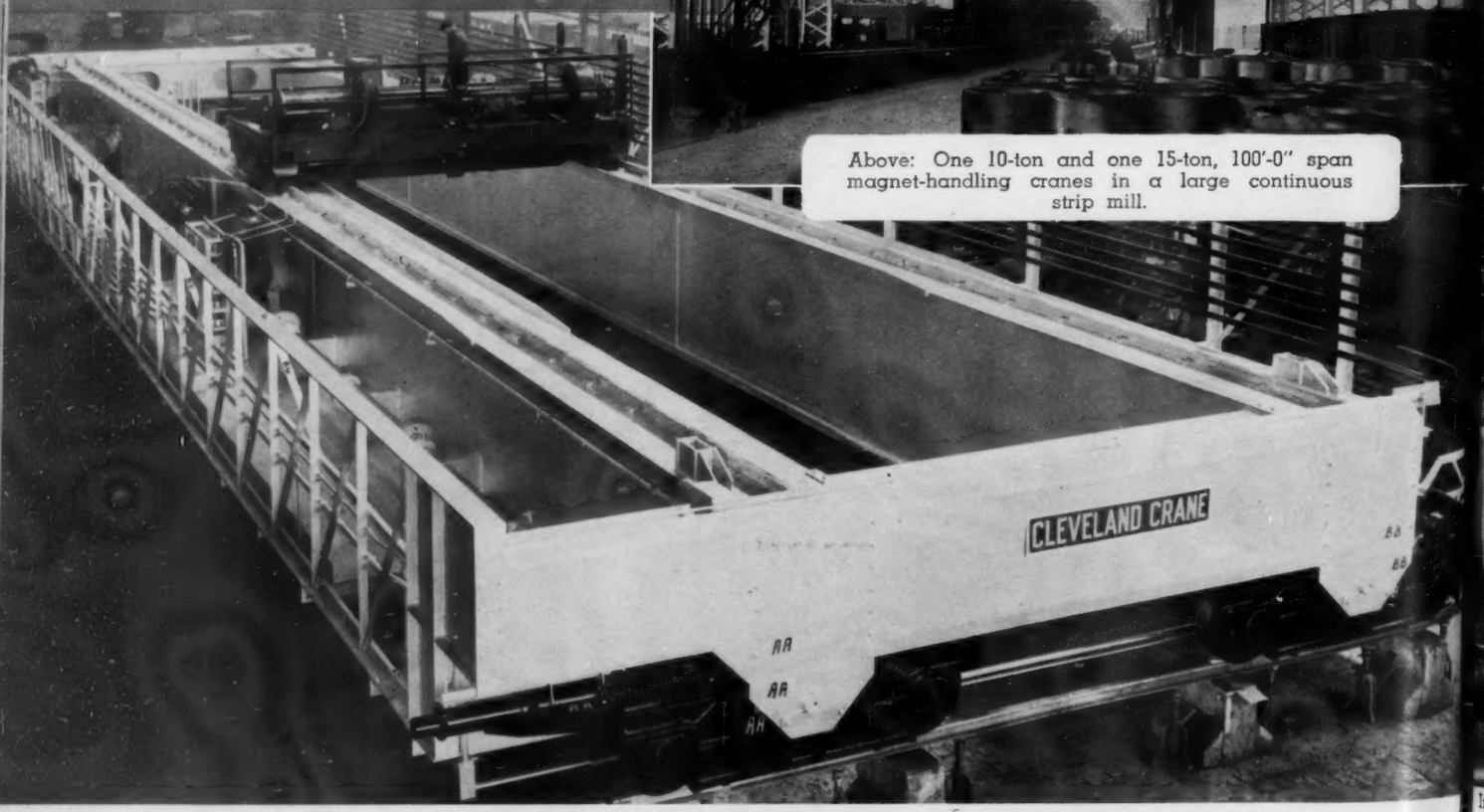
Cleveland Cranes

ALL WELDED OVERHEAD TRAVELING CRANES

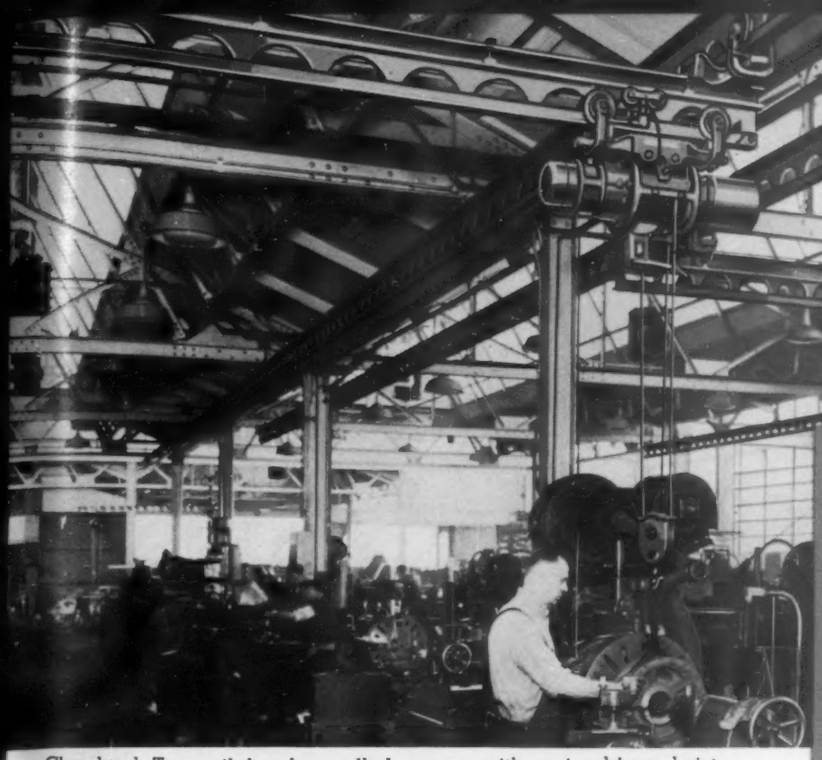
Two 15-ton, 100'-0" span steel mill cranes operating over continuous pickling lines.

Above: One 10-ton and one 15-ton, 100'-0" span magnet-handling cranes in a large continuous strip mill.



World's longest span all-welded crane. 15-ton, 120'-0" span. One of 15 duplicate cranes on one order.

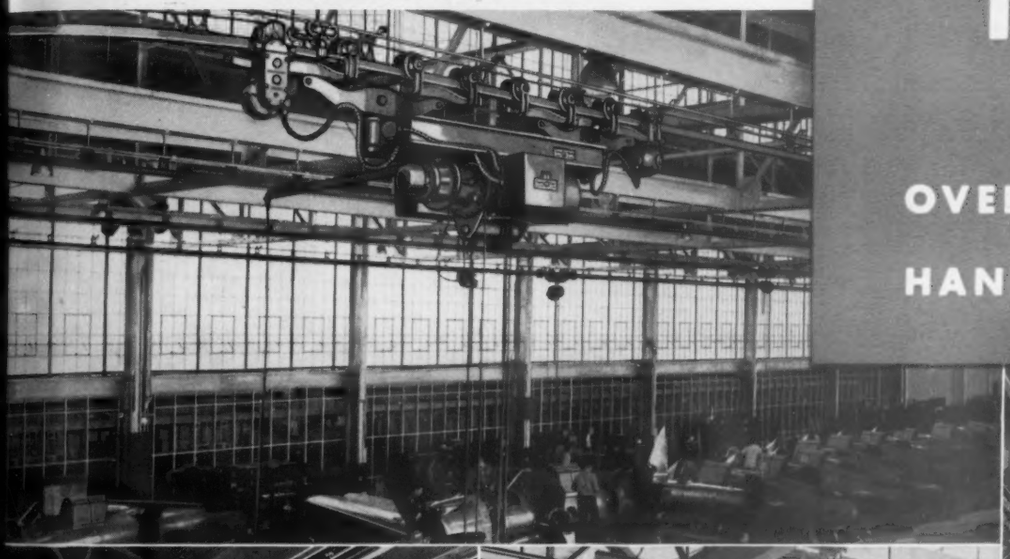
THE CLEVELAND CRANE &



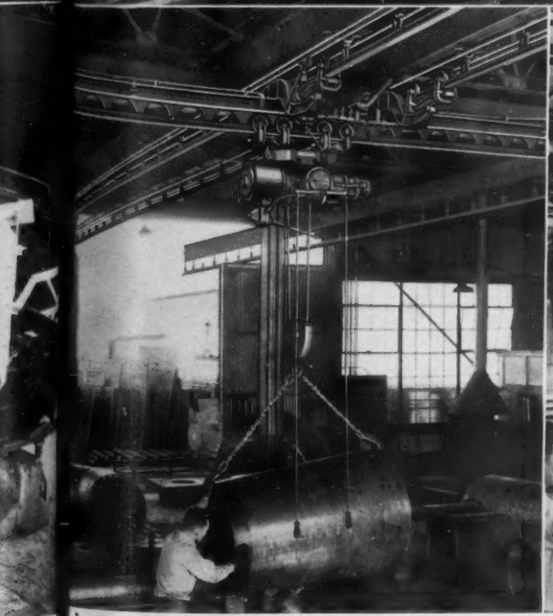
Cleveland Tramrail hand-propelled cranes with motor-driven hoists in the machine shop.

Cleveland Tramrail

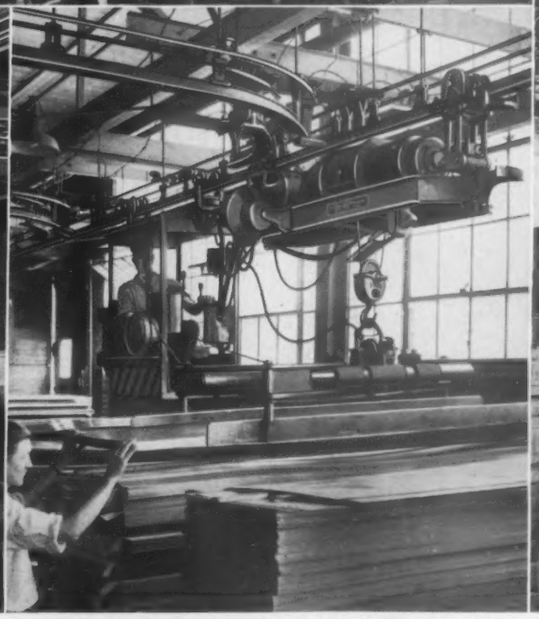
OVERHEAD MATERIALS HANDLING EQUIPMENT



Left: In many aeroplane factories complete plant coverage is obtained with Cleveland Tramrail motor-driven hoists and carriers.



In this structural shop crane interlocks are used to permit transferring the load from crane to crane.



Packs of sheet steel are easily taken to and from storage by this cab-controlled Cleveland Tramrail system with motor-operated grab.

Handling 32-100 lb. kegs per lift. Interlock permit transferring cab-operated hoist an carrier to crane bridge in next bay.

& ENGINEERING CO., Wickliffe, Ohio

Steelweld Machinery

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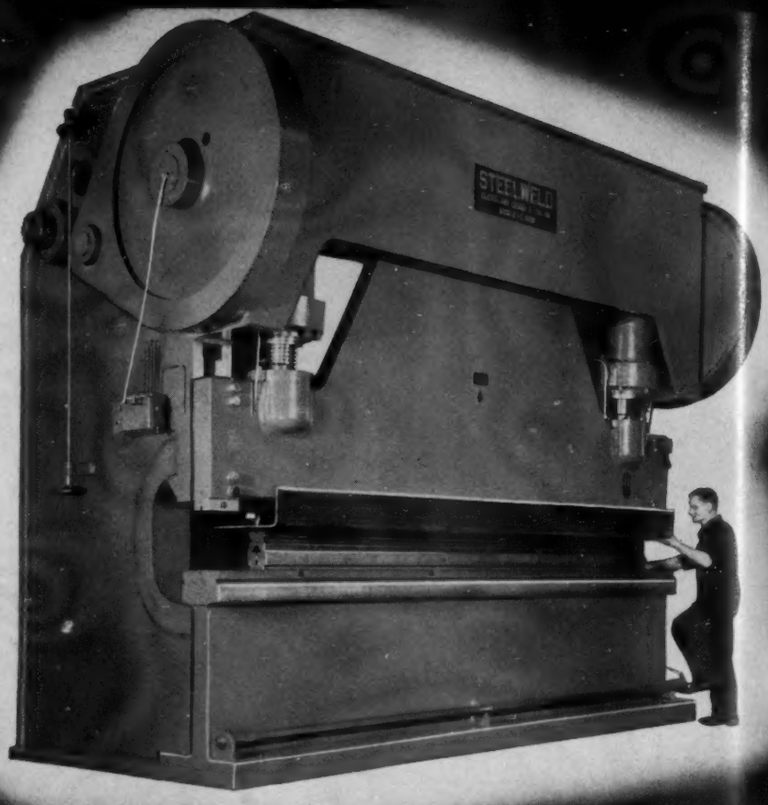
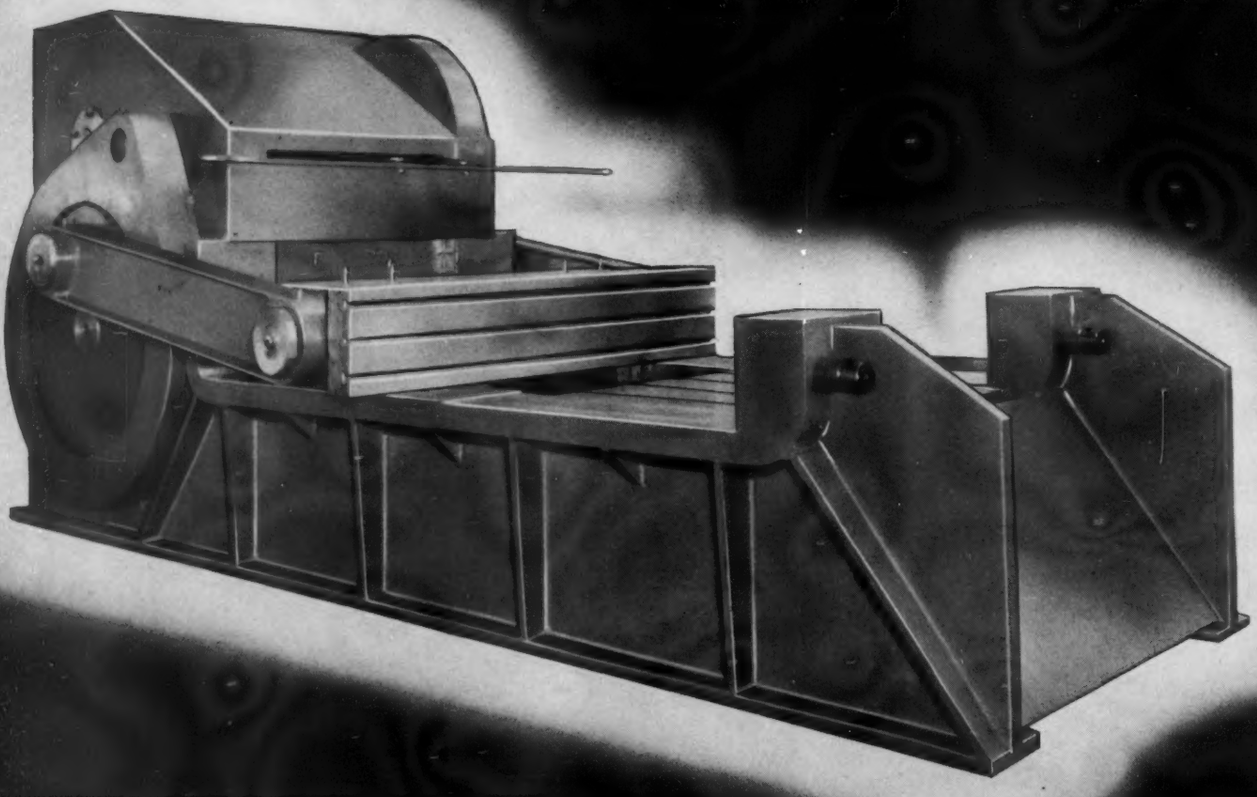
BULLDOZERS

SPECIAL MACHINERY



Heavy one-piece all-welded steel frame, extra deep throat and many other exclusive features make Steelweld Bending Presses the most modern and versatile available today.

For heavy power requirements Steelweld Bulldozers cannot be excelled. When driven by proper motor their all-welded frames are guaranteed unbreakable. Every part is built for years of trouble-free service.



The Steelweld Machinery Division is represented by Cyril Bath & Co., General Sales Agents, East 70th St. and Machinery Ave., Cleveland, Ohio

THE CLEVELAND CRANE & ENGINEERING CO.

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hardening and flame softening. This latter important development works directly with machine flame cutting to counteract the hardening effect of flame cutting certain steels.

Previously, general shape cutting the hard structural steels was considered almost impossible unless large capacity heat-treating furnaces were available. Flame softening overcomes this difficulty economically.

Flame hardening has been extended greatly through the development of standardized apparatus and procedure. Among many new applications, hardening rolls and shafts appears to be outstanding. Early attempts to flame harden work of this nature were not very successful, thereby limiting the application of the process. Development of the vertical spinning method overcame practically all previous difficulties and now cylindrical work may be suspended in a vertical position and rotated while a ring of flames traverse it from top to bottom securing the maximum hardness of the material without measurable distortion.

Increasing use of the Oxy-Ferrolene process in England is of absorbing interest to all branches of the steel industry. This process consists of impregnating city or coke oven gas with the vapor of Ferro gas generated in the Oxy-Ferrolene plant. When thus combined, the ignition point of the resultant gas is lowered, the flame temperature is raised to almost that of acetylene and the danger of explosion is eliminated. It is claimed that this combination is 20 to 30 per cent more economical than low pressure generated acetylene and 75 per cent more economical than dissolved acetylene.

Cutting speed of this gas is said to be equal to that of acetylene. Delivered by pipe line, it eliminates the residual sludge of a carbide generating plant or bottles where dissolved acetylene is used.

Induction hardening inside surfaces is another step toward mechanized heat treating. This process permits production hardening of inside diameters of metal cylinders from 2 inches in diameter up and in lengths limited only by available equipment. It permits the machining of the outside diameter and all other unhardened areas after heat treatment of the inside diameter of the bore as the depth of the hardened areas after heat treatment and the area which can be machined after hardening are precisely determined. Parts can be hardened to 58 to 64 rockwell C in one to three seconds. The machines are designed for rapid changeover from one size to another. Flexibility and accuracy of control permit efficient production of various size units without loss in time or production during changeover.

NEED MORE INFORMATION ON THE WELDABILITY OF COPPER ALLOYS

BY J. R. HUNTER
Welding Engineer,
Revere Copper & Brass Inc., Rome, N. Y.

■ WHILE welding is extremely useful in joining copper base alloys, it finds limited use in the current rearmament program as the largest outlet for these alloys is in such items as condenser tubes, tube sheets, cartridge cases and seamless cupro-nickel for salt water lines—applications which do not involve welding with the exception of the latter. The limited use of welding is, however, no reflection on its importance in the fabrication of Kingston valves, deck plates around magnetic compasses, low pressure oil reservoirs, air and gasoline tanks for field kitchen stoves—all applications where carbon arc welded silicon-bronze is employed, as well as the fabrication of cupro-nickel water boxes and the erection—and even fabrication—of cupro-nickel tubing for salt water lines.

Proper choice of joining method depends on many factors. However, the fact that different fabricators employ different methods on the same type of work and that the same method is employed by different fabricators with varying degrees of success shows lack of experience and/or an understanding of the factors affecting the weldability of the various copper base alloys. This illustrates the growing need for classifying the various alloys as to their weldability by various methods. This would aid both designers and fabricators.

SIMPLE WELDED FRAMING PERMITS LARGER PLANT WORKING AREAS

BY ALBERT S. LOW
Vice President and Chief Engineer,
The Austin Co., Cleveland

■ STEADY advances in the development of new and more efficient welding techniques have naturally increased the interest of industry executives in structural welding for their new plants. Favored initially because it permitted reductions in weight and more simple framing, welding today is expediting the application of functional design in cross-sections that open up broad working areas which are free from nonessential crossmembers that only obstruct operations and light and catch the dust. It is interesting to note the increasing use of the welded rigid frame sawtooth design introduced in 1937. It has been favored by concerns now building new plants in conjunction with the national defense program in widely separated sections of the country. Buildings of this type already in service or under contract will bring the total area of plants applying this cross-section to more than a million square feet.

18-GAGE 18-8 STAINLESS WELDED AUTOMATICALLY BY SMOTHERED ARC

BY T. R. LICHTENWALTER
Republic Steel Corp.,
Central Alloy Division, Massillon, O.

■ THE PAST few years have found a remarkable increase in the use of stainless alloys containing 12 per cent or more chromium and 17 per cent chromium plus 7 per cent nickel and upwards. Stainless is used in radio equipment for springs so tiny they look like jewelry. On the other hand, stainless is used for huge vessels weighing many tons, largely assembled by welding.

You may ask: Why do the uses for stainless increase by leaps and bounds every year? The best answer is its great resistance to corrosion and its ease of cleaning. Too, the welding industry has worked closely with the manufacturer and fabricator so that former difficulties encountered in welding are now behind us. Gas welding equipment has been improved to hold steady uniform flames. Electric arc welding equipment now can supply the lower currents required, yet will maintain an even steady heat at the arc.

Silver brazing alloys and fluxes that can be used to join stainless to copper and many other nonferrous alloys also help. These silver solders melt in a temperature range that is not detrimental to the stainless. In a properly made joint, no trouble is experienced with intergranular penetration of the brazing medium as is generally the case with bronze welding rods. While generally these silver soldered joints are made with an oxyacetylene torch, some production setups lend themselves well to the use of an electric resistance welder. Arc welding electrodes now give the operator easily controlled and smooth flowing welds with corrosion resistance equal to that of the base metal.

One of the two newcomers in automatic welders is similar to the automatic metallic arc types of welders known in the past, but is arranged to feed the required flux around the electrode as the bare filler rod is fed through the automatic head. The other is the "smothered arc" system. As its automatic head is guided down the seam, granulated flux is fed in ahead of the bare electrode to envelope and protect the arc. Some flux is fused and covers the molten pool. This fused slag protects the weld till cool, yet it can be easily removed.

Resulting welds are of good quality, being uniform in both penetration and amount of reinforcing. Butt and lap welds have been made in this welder on as light as 18 gage, 18-8 type stainless, in 20-foot lengths.

Another new arc welder is claimed capable of welding 28-gage, 18-8 stainless. This welder employs rectifier tubes to convert alternating line current into direct current for welding. Small-diameter shielded electrodes are required. Successfully welding thin gages depends only on proper fixture design and operator skill for this welder correctly meets the heat requirements.

WELDING FABRICATORS ARE EAGER FOR MORE BASIC INFORMATION

BY G. F. JENKS
Colonel,
Ordnance Department,
U. S. Army, Washington, D. C.

■ WELDING has made the greatest progress in those industries in which service requirements are the most severe. In pressure vessels, the safety of life and property depends upon the integrity of the weld. In engines and heavy machines, operation requires of the weld a high resistance to fatigue. The engineer has developed controls in the processing of materials and the fabrication of these structures which have led to the acceptance of the welded construction as good practice.

In national defense industries, this trend is exemplified in the acceptance of welded construction in gun carriages, bombs and some other types of ammunition. Most of this work involves the use of low alloy steels, careful process qualification and rigid inspection requirements. Emphasis on proper engineering planning and practice has permitted the simplification of qualification tests for operators without loss of control of weld quality.

The same trends toward improvement of control by industry are seen in the interest given to the welding research committee's program in studying the weldability of carbon steels, the development of methods of testing and numerous other programs of research. Both the producer of materials and the fabricators are demanding facts upon which to base intelligent decisions as to specifications, codes and practices. Until these facts are known, design practice is a matter of judgment and economy in the use of labor and materials—a slow development by trial and error.

In structures involving the cheaper tonnage steels, welded fabrications have not been generally accepted. Can it be that industries using cheaper steels are impatient of the cost of engineering service to solve their problems of control? Such problems are not solved by throwing the responsibility upon the individual welder and requiring him to be an artist. Rather, as in the case with the more expensive materials, the solution lies in more engineering. Acceleration of the application of welding to such structures would result from a more general co-operation of fabricators in research and standardization. There are signs of such a trend.

The most promising trend in welding is this growing recognition of the need of more authoritative information, better engineering and the willingness to pay the cost.

Above are author's personal views, not official statements.

EQUIPMENT REHABILITATED FOR DEFENSE BY BRONZE WELDING

BY I. T. HOOK
Research Engineer,
American Brass Co., Waterbury, Conn.

■ DURING 1940, progress in copper welding has thus far been more in refinement of detail than in any radical change. Thus the flux coating experts, who have done a good job in shielding the steel arc electrodes, have made a good start in copper alloy electrodes. These are now commercially obtainable in copper, super nickel, Everdur and phosphor bronze.

In the national defense program just getting under way, copper alloys joined by welding are playing an important role. Many pieces of outmoded equipment can be brought back to a satisfactory state of efficiency by bronze welding, rebuilding worn surfaces with bronze and making additions with bronze welding to improve the performance. Weld metal from the manganese bronzes or the phosphor bronzes has excellent wear resistance and good nongalling qualities when used in rubbing contact with a ferrous metal.

Some high-capacity copper bus installations in new electrolytic reducing plants built to meet the demand for light metals for aircraft have been butt welded with the carbon or metallic arc and a copper alloy filler rod. In new ship construction, silver brazed super nickel tubing and fusion welded super nickel condenser water boxes will help avoid troubles from salt water corrosion. Copper water tubing with wrought copper or cast brass sweat fittings makes possible rapid installations of plumbing services in new homes, industrial buildings and cantonments. Large wrought sheets of phosphor bronze fusion welded with phosphor bronze electrodes to make special chemical equipment have been made available to the chemical industry.

Combinations of copper alloy such as Everdur welded to steel are not new but they are finding increasing use as a measure of economy in making certain equipment and as a means of insuring the quality of the chemical carried in the copper alloy side.

WELDED AIRCRAFT JOINTS SOON TO HAVE STRENGTH OF 200,000 P.S.I.

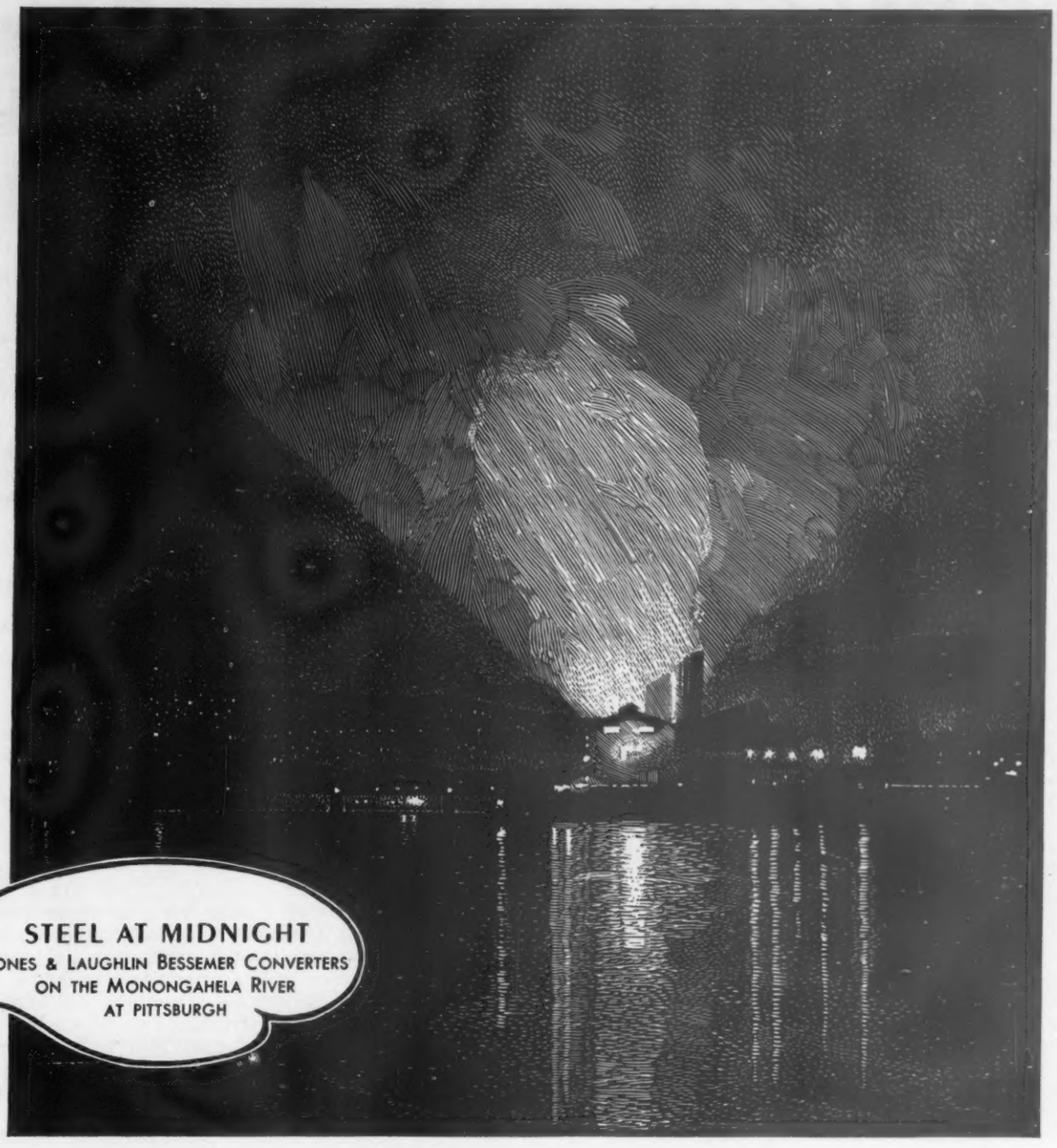
BY GEORGE V. SLOTTMAN
Manager, Applied Engineering Department,
Air Reduction Sales Co., New York

■ AS A result of continual laboratory research, many of the welding, cutting and allied processes utilizing the oxyacetylene flame have been improved. Refinements in equipment design and improvement of techniques are largely responsible for this advancement. Outstanding progress has been made in flame machining—removing metal by surface oxidation. It is analogous to tool machining, except that the tool used is a large oxygen stream. It utilizes the same chemical reaction as flame cutting. The cut is not permitted to penetrate through the work, as in severing, but is restricted to removal of a predetermined depth and width of metal from the surface.

Closely associated with flame machining is hand gouging, principally used for removing defective welds, the roots of welds and defects beneath backing up strips. Further, it is sometimes advisable to manually gouge for "U" curves on edge butted plates rather than set up a machine as when flame machining. Close co-operation has been established with shipyards with the result that many special cutting machines have been developed for such unusual jobs peculiar to this industry as cutting lightening holes in floor plates, I-beams to T-shapes and channels to ship ribs, using light weight portable machines in most cases.

Here are some things manufacturers of oxyacetylene flame equipment are doing to help the national defense program: An alarming shortage of qualified welders is being met by operator training schools springing up all over the country. Oxyacetylene training exercises, lectures for instructors, together with other informational aids such as wall charts showing cross sections of torches and regulators are now available. While these alone will not train welders, they will help.

Aircraft manufacturers desire to weld faster and to make stronger joints. Research indicates that welding rods suitable for welding aircraft assemblies of SAE 4130 and 4130X for subsequent heat treating to tensile



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strength as high as 200,000 pounds per square inch will soon be available. Special tips have been developed to facilitate welding the clusters of tubing on work of this character.

BETTER, FASTER WELDING IS DONE AUTOMATICALLY IN ALUMINUM

BY G. O. HOGLUND
Welding Engineer,
Aluminum Co. of America, New Kensington, Pa.

■ NEW PHASES of welding as applied to aluminum alloys during the year have been concerned primarily with development of automatic processes for resistance welding, arc welding and brazing. The impetus provided by the aircraft program in this country has brought about the development of new resistance welding equipment and methods to apply spot welding. Service experience with spot welded wing covering cowling, several thousand gasoline tanks and many other applications has indicated that the mechanical performance of spot welds can be relied on and that the method provides the smooth surface that is necessary aerodynamically for high-speed aircraft.

Automatic methods for assembling tank structures by arc welding have been developed to the production stage during the past year. The method was first used to assemble aluminum alloy tank cars. The welding heat is applied by a carbon arc with a superimposed alternating current field to control the arc. It has been possible to improve the soundness of the welds and the speed of welding over previously used manual welding operations. Distortion also was decreased.

Production by brazing has expanded rapidly. Over 100,000 outboard motor tanks have been assembled by furnace batch brazing. Refrigerator shelves also are assembled by this means. Production of other refrigerator parts, aircraft magneto housings, air moving fans, aircraft intercoolers and many more parts is planned in the near future. Preliminary experimental work to establish brazing methods and the suitability of brazed joints on these parts has already been accomplished. Investigation of mechanical properties indicates that strength of brazed joints is the equal of welded joints in the common alloys and is superior to welded joints in the heat-treated alloys. This is possible because brazing and heat treating can be combined. Corrosion resistance and fatigue strength appear comparable to fusion welded joints.

AS IN WORLD WAR I, WELDING AGAIN HELPS NATIONAL DEFENSE

BY K. L. HANSEN
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■ SHORTLY after our entrance into the World War I, the government took over some German ships that had been interned to escape capture by the Allies. Before surrendering the ships, the crew did a thorough-going job of sabotage on the engines. Time estimated to replace the damaged castings with new ones made it seem highly probable that the ships would be useless for the duration of the war. Then, in an incredibly short time, it was announced that the ships were ready for service. Curiosity was aroused as to how this miracle had been performed. To the amazement of the general public, it was learned that the answer was "fusion welding." From that time, welding has come a long way—and fast.

Once more our country is preparing on a large scale to meet a critical international situation. How does the status of welding in the present defense program compare with that of 23 years ago? In the navy, long considered our first line of defense, welding has long since ceased to be merely a repair tool. It is a production tool of first importance, as witnessed by the enormous extent to which it is used in modern ship construction. Aerial battles figure conspicuously in the war news these days, testifying to the increasing importance of airplanes in modern combat. Indeed, the opinion is becoming prevalent that the air corps vies with the navy as a first line of defense. Already important in building aircraft and destined to become more so in the future, welding likewise is playing its part in mechanization of the army. Hundreds of manufacturers supplying military equipment use welding to fabricate their products. Every government arsenal has a well-equipped welding department at its disposal.

To what is due this remarkable transition in the status of welding that has taken place over a quarter of a century? To a great amount of diligent, patient research work carried out by a number of investigators and co-ordinated by a central body; to a general interchange of ideas and data; and to effective dissemination of the knowledge thus accumulated. It is in this connection that the American Welding society has rendered and is continuing to render a most valuable service to industry.

WELDING SAVES FUNDS AND STEEL ON LARGE DRY DOCK CAISSONS

BY COMMANDER C. A. TREXEL*
Design Manager,
Civil Engineering Corps, Navy Department,
Bureau of Yards & Docks, Washington, D. C.

■ WELDING is making a definite contribution to national defense. The past year has been characterized by a much broader application of welding to structures designed and built by the bureau of yards and docks, navy department. Such wider application of welding during the stress of a high speed and very heavy construction program was facilitated by having available adequate and proven standards of welding design and inspection developed during the past three years and also by having available an indoctrinated design personnel to whom welding was no longer a stranger. Not only was welding more generally employed on the usual types of engineering structures but it was also adopted for important structures on which it had heretofore not been used for certain technical reasons, notably large dry dock caissons. In the construction of a number of these important structures, welding effected a substantial saving of funds and steel. Any saving of metal is of course a direct contribution to conservation of this essential material. Without question welding is playing a most important role in restoring our national defenses.

The opinions contained in this article are the private ones of the writer and are not to be construed as official or reflecting the views of the navy department or the naval service at large.

SHIP HULLS NOW WELDED FASTER THAN THEY CAN BE RIVETED

BY T. M. JACKSON
Electrical Engineer,
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

■ ANNOUNCEMENT of the first all-welded tanker built at the Sun yard for the Atlantic Refining Co. in 1937 created great interest in shipbuilding circles. Today all-welded ships are commonplace. Sun has completed eight all-welded tankers of large size and 10 large cargo vessels more than 85 per cent welded. Of some 43 other vessels on order, 18 will be all-welded and the balance about 85 per cent welded. The first large all-welded cargo ship was recently launched at Ingalls Shipbuilding Corp., Pascagoula, Miss.

The time required to complete an all-welded hull at Sun is now less than for a comparable riveted hull. Such speed of construction is made possible by the

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FULL THICKNESS	For maximum insulating protection, the insulation you use must not sag or compress during application, or deteriorate in service. J-M Block and Pipe Insulations are designed to avoid such dangers . . . and they can be applied without risk of voids or thin spots.	✓
MOISTURE RESISTANCE	This feature is particularly important in refrigeration service, since moisture infiltration causes most low-temperature insulation failures. J-M Refrigeration Insulations offer unusual moisture resistance, and, because of their basically mineral composition, are rotproof and verminproof as well.	✓
STABILITY IN SERVICE	If maximum fuel or refrigeration savings are to continue indefinitely, the insulation you use must not only possess the above characteristics at the start, it must retain them throughout the life of the equipment on which it is used. The column at the left gives some brief facts on a few of the many J-M Insulating Materials.	

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Unionmelt process. Automatic fillet and butt welds are made on large shop subassemblies, later erected on shipways and manually welded together. Subassemblies up to 40 x 40 feet and weighing up to 35 tons are shop welded with this process. Where the work is brought to the machine and positioned for flat welding, this equipment greatly increases fabricating speeds. Fillet welds of size required in merchant ship construction are made in one pass at speed of 25 to 30 inches per minute. Butt welds on plate up to 1¼-inch thick, about the heaviest required, are made in one pass completely through the section at speed of about 9 inches per minute. Butts on ⅜-inch plate are made at a rate of 25 inches per minute. A light finishing pass is made on the under side of butt welds to insure complete penetration and good appearance. Current values up to 1700 amperes at 40 volts are employed.

An entirely different setup using the same process is being extensively used in welding pressure vessels to ASME and API-ASME code requirements. After being tacked together sections of vessels are mounted on turning rolls under the automatic welding head. Main shell seams only are welded with the process, first one pass on the inside followed by one pass on the outside. Speed of welding and current values are similar to those named above for the same plate thickness. Plate sections up to 2½ inches are butt welded in two passes.

Properly applied with competent supervision, the process produces X-ray sound, ductile welds having tensile strength and other physical properties at least equal to the plate material. Welds made as described are accepted by classification societies and government departments having supervision over merchant ship construction, and by insurance companies and other regulatory bodies having supervision and approval of pressure vessels built to code requirements. Above comment applies only to merchant ship construction. Some application of the Unionmelt process is being made to vessels for the United States navy in other yards, it is understood.

SEES 1600-AMPERE MANUAL METALLIC ARC WELDING WITHIN A YEAR

BY ROBERT E. KINKEAD
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■ PROGRESS in welding, like progress in other technical fields, is being surveyed these days in terms of what it can do to aid rearmament and to help us in the economic war that seems bound to follow the cessation of violent hostilities. No one even casually acquainted with the distribution of welding and cutting equipment and supplies doubts the ability of the welding industry to meet all needs. The industry has anticipated requirements rather than waited for a bottleneck to develop. In the resistance welding field where a great deal of equipment is built to order, plant expansion and facilities have been kept ahead of requirements.

Two inventions of special significance in rearmament activity have received a good deal of attention in the last year. R. K. Hopkins developed a new method of metallic arc welding adaptable to the manufacture of composite metal armorplate said to have many fabrication advantages in addition to effectiveness in stopping bullets. The process also can produce a wide range of commercial composite metals, such as stainless clad. The invention of David Sciaky of Paris, France, opened up new fields of precision spot welding in thin gage metals used in airplane construction. The basis of the process is to vary the pressure as well as the current in the spot welding cycle.

In the field of invention nothing intrigues the welding fraternity so much as the possible welding developments which may result from discoveries being made by the scientists working with the cyclotrons which are rapidly becoming more numerous. One discovery like that in which the properties of Uranium 235 were disclosed might upset most of our present ideas of how to join metals.

Manual metallic arc welding is susceptible to enormous improvement. The immediate future promises better preparation of joints, better positioning, better materials handling up to the welding operation, much heavier welding currents, better electrode holders, more effective protection of the operator from the heat radiated by heavy welding currents. The present idea that 400 to 500 amperes is the upper current limit for manual metallic arc welding will be out of date within a year, and 800 to 1600 amperes will be handled where the thickness of the work permits and automatic welding is not applicable. We are far from accepting the idea that to compete with any nation in the world we will have to go back to a "12-hour day for two dollars pay." Too much is ahead in welding improvements to consider such nonsense. The world is a much more dangerous place to live in than it was a year ago, but it is also a much keener and more resourceful world—in the welding business at least.

GAS RADIANTS PROVE EFFICIENT SOURCE OF RADIANT ENERGY

BY HARRY W. SMITH JR.
American Gas Association, New York

■ THE YEAR 1940 has seen three relatively new techniques in gas utilization by the metal industries really take hold: (1) the continuous bright annealing of wire in *open* flames without furnace or atmosphere tube, (2) the application of gas radiants to the baking and drying of metal finishes by infra-red-ray radiation, and (3) the successful adaptation of "submerged" or underwater combustion to the heating of pickling tanks and plating baths. In early 1939, all three were interesting possibilities—today, all three have proved practical.

Open-flame wire annealing has permitted higher speeds, adaptation of the process to "straight-through" production lines without the necessity of waiting for heating-up periods. It has also been found possible to control the anneal automatically by a special device which actually "feels" the wire as it races on towards the final reel, and accordingly, controls the chemical composition and temperature of the gases burning along the particular path followed by the wire as it pierces the long row of open flames.

The application of gas radiants to the infra-red-ray baking of synthetic finishes has developed to capitalize upon advantages of radiant heat in special types of work disclosed by experimentation with electric infra-red-ray lamps. Few believe that infra-red-ray baking will supplant the use of recirculated or nonrecirculated convected hot air in the big finish-baking market. But for special types of jobs, radiant heat has been found to give faster results. In very few cases can convected heat be entirely foregone—for flushing evaporated volatiles out of the work chamber and for carrying heat "into the shadows." At least a dozen applications of gas radiant burners to curing finishes on both ferrous and nonferrous parts have been made recently.

FLASH BAKERS HELP WIRE MILLS; "BACK PULL" TO BE UTILIZED

BY KENNETH B. LEWIS
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43 Midland Street, Worcester, Mass.

■ BUSINESS among the wire mills during the past year has been good, though spotty. The effect of war and defense plans has been a general quickening rather than the desperate scramble for a few items which marked World War I.

Three or four more devices and practices of signifi-

cance are peeping over the horizon. The flash baker is being used to preheat new acid baths by the alternate heating and immersion of pins or rods, thus promising to solve an awkward problem for many small mills in which it is now necessary to maintain a disproportionately large boiler plant. An enterprising concern is experimenting with an annealing scheme along the lines of flash baking, so that a gantry crane can clean and anneal in the same straight line.

Through the Smith-Stringfellow patent, a practical way has been found to cash in on the acknowledged benefits of "back-pull" in wire drawing and to explore those advantages which are clearly indicated mathematically. The principle involves a back pull which adjusts itself instantly to changes in die conditions. The form in which it has been worked out lends itself nicely to continuous drawing.

Strand annealing, patenting and tempering through the resistance of the strands to the passage of an electric current is giving a product which, though admittedly differing slightly in properties from that of the fuel job, differs in a desirable way.

INSULATION APPLIED IN FORM OF PAPER PULP ELIMINATES LAPS

BY H. C. BOYNTON
Chief Metallurgist,
John A. Roebling's Sons Co., Trenton, N. J.

■ SUBMERGED combustion, a new form of gas immersion heating of pickle baths, claims agitation, more uniform temperatures, less evaporation and practically no loss of acid. Pickling time and cost are cut. Improvements in wire machinery for drawing and transportation are legion. Soft steel is now being drawn into fine wire at speeds exceeding 2000 feet per minute and copper at speeds of more than 8000 feet per minute. Multiple hole wire drawing is standard for many jobs. Back pull and reactive drawing are making headway. There are at least three manufacturers who have presented machines for applying back pull to improve the quality of wire. Since the back-pull principle cannot be patented, the makers have patented the means for applying this stress.

Insulated wire manufacturers have also been active. New and better means for applying enamel are being used; the older varnishes and lacquers are being replaced by synthetic enamels in much the same way the six coats of varnish on autos have been replaced by fewer coats of synthetic enamel. Paper insulation spirally wound on telephone wire is being replaced by applying a thin solution of paper pulp, drying to a thinner layer with no laps and enabling many more pairs of wire for a given size cable than formerly. Glass insulation is increasing in use where resistance to heating is demanded; a layer of asbestos is put on the glass yarn, varnish and the usual braid over all. Such insulation resists abrasion much better than just asbestos.

REFRIGERATOR TRAYS CONSUME BIG QUANTITIES OF STAINLESS WIRE

BY J. K. FINDLEY
Sales Metallurgist,
Allegheny Ludlum Steel Corp., Dunkirk, N. Y.

■ CONSUMPTION of stainless steel wire has apparently increased during the past year in proportion to increased consumption of wire. Cold-headed screw products, welded shelves, trays, baskets, aircraft tie rods, and welding rod cores have accounted for most of the larger and intermediate gage wire. Wire cloth and screens for the paper and chemical industry, corrosion and heat resisting springs, aircraft control cord and ignition cable, and some metallic sponge wire are major uses for the lighter gages. The largest percentage of weight in the stainless cold-headed products, also trays and shelves, has been in the low carbon, approximately 17 per cent chromium analysis, while most other products are of the 18-8 stainless variety.

Stainless wire has its place in our national defense program. Quantities of the higher chrome-nickel type welding rods already are being used in welded ship construction. Streamline tie rods, control cords and ignition cables for army and navy aircraft have consumed much stainless wire and the volume is increasing rapidly. While new uses are continually being found for stainless steel wire, the use of familiar stainless wire products is continually growing.

AMERICAN INROADS ON EUROPEAN WIRE MARKETS DEFINITELY SEEN

BY B. L. McCARTHY
Chief Metallurgist,
Wickwire Spencer Steel Co., Buffalo

■ THE RECENT increase in export wire business due to the lack of European shipments has thrown some light on prewar European wire manufacturing practices and some interesting comparisons between European and American methods of wire manufacture are being obtained. In general this comparison indicates the use of more labor and lower quality basic materials in Europe than here, as was expected. While some difficulties are being encountered by consumers in accustoming themselves to use of American wire, the quality appears improved over material previously furnished from Europe. Definite inroads, based on quality, are being made by the wire manufacturers of this country and these will persist long after hostilities have ceased and European shipments resumed.

Threatened shortage of Swedish wire and rods deeply concerns some American consumers. American wire manufacturers are taking steps to produce substitutes which will remain as domestic materials long after Swedish rod and wire shipments are resumed. The present situation has made consumers view substitutes much more favorably—perhaps the biggest obstacle to overcome. These factors give every reason to believe that a large percentage of material formerly imported will be produced domestically in the future. In connection with the defense program the wire industry is meeting the need for co-operation by the formation of committees to assist the national government in the emergency procurement of wire.

CEMENTED CARBIDE TOOLS NOW STANDARDIZED COVER MOST USES

BY K. R. BEARDSLEE
General Sales Manager,
Carboloy Co. Inc., Detroit

■ OUTSTANDING development during the past year in use of cemented carbides is the tremendously increased application in machining steels. While use of carbide tipped tools for machining cast iron and nonferrous metals has continued to increase, progress in steel cutting has been far more striking—some 400 per cent increase in the first six months compared with the same period last year.

Largely stimulating this development is actual "defense" production. This follows a similar development in both Germany and England where cemented carbides increased output four to six times. Large-scale use of cemented carbide tools already is being made here in machining gun barrels, shells, cartridge cases, etc.

In the wire, bar and tube drawing field there has been a definite trend to use such dies for larger and larger work. Development of "scalping" dies for rod drawing has simplified enameling problems. Development of shaped dies in the cored state for drawing special shapes will shortly open up new production possibilities in that direction. Cemented carbide dies for press work also have increased markedly with a trend toward use

QUALITIES that only ALLOY STEELS can give you

● There are many quality steel requirements that only alloy steels can meet. Alloy steels also are economical in the long run.

Hardness, Strength, and Elasticity

In the engineering steels, alloys increase the depth to which hardness penetrates on heat-treatment and thus make possible closer control of physical properties. Alloy steels respond more uniformly to heat-treatment and are less subject to distortion and cracking during hardening. In addition, they have higher impact strength, toughness, and wear resistance for any given hardness.

Parts subject to frequent and sudden reversals of load are apt to fail through fatigue. Steels alloyed with the proper elements, besides being finer-grained, stronger, and tougher, have consistently higher elasticity and endurance ratio.

Resistance to Corrosion, Heat, and Abrasion

Only alloy steels have high resistance to corrosion, oxidation, scaling, and creep. Such steels are essential throughout industry wherever equipment is exposed to severe corrosion, excessive heat, or both.

Wherever severe service demands a tough, abrasion-resistant steel, alloy steels are the answer. In equipment for handling rock and ore, for example, only alloy steels have satisfactory resistance to the severe impact and wear involved.

High-Strength Structural Steels

High-tensile, mild-alloy steels combine high strength with good ductility in the as-rolled state. They can be flame-cut and welded without subsequent heat-treatment. Used as structural steels, they reduce dead weight and increase pay load.

Let Us Help You

We do not make steel, but have for over 30 years produced "Electromet" ferro-alloys and alloying metals used in making steel. During this time, we have co-operated with the steel industry in developing new and better alloy steels for the specialized needs of industry.

If you have any questions regarding the manufacture, fabrication, or use of alloy steels for a specific purpose, we shall be glad to help you find the answers. This consulting service is impartial and is available to you without obligation.

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Unit of Union Carbide and Carbon Corporation
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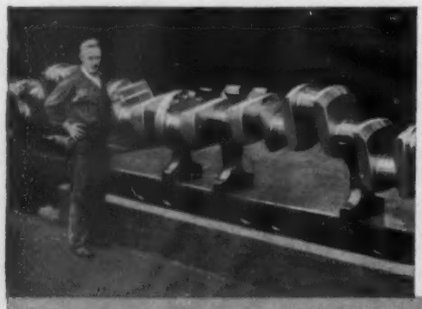
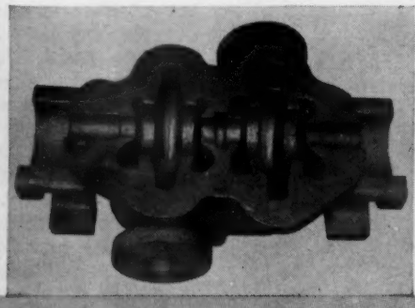
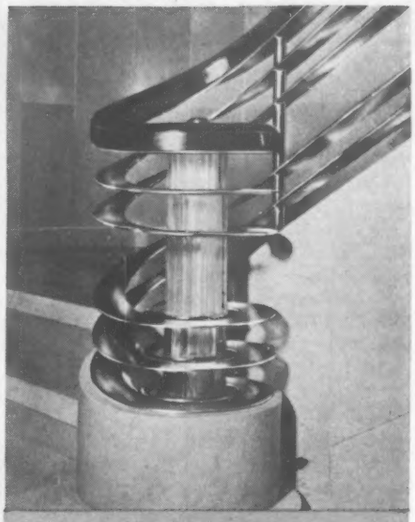


Hardness and Strength—*Alloys such as chromium, manganese, and tungsten increase the hardenability, strength, and toughness of large machine parts.*



Tough, Ductile Castings—*High impact resistance and ductility are imparted to steel castings by such alloys as vanadium and zirconium, which refine the grain structure.*

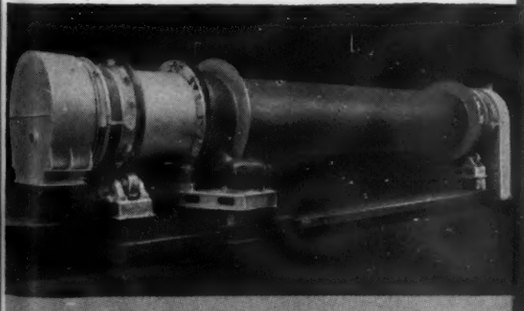
Impact Strength and Wear Resistance—*Dipper buckets, dredging pumps, crushers, and other mining equipment are made tough and abrasion-resistant with manganese and chromium.*



Rustlessness—*Steel made stainless with chromium is an architectural material of lasting luster and beauty. It is useful as well as decorative.*

Strength and Ductility—*High-strength structural steels containing small amounts of chromium, manganese, and silicon transfer pounds from dead load to pay load.*

Fatigue Resistance—*The elasticity and high endurance ratio that vanadium imparts to steel help prevent fatigue failure in springs and other parts.*



Corrosion and Heat Resistance—*Equipment exposed to severe corrosion or high heat, or both, would not last without the resistance that chromium and columbium impart.*

Visit Us at the Metal Show

What properties are imparted to steel by various alloying elements will be shown at our exhibit in Area D-14, National Metal Show, Public Auditorium, Cleveland, Ohio, October 21-25. Don't miss it!

Electromet

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in larger work. Defense work now employs cemented carbide dies for deep drawing cartridge cases ranging from 0.3 to 8.5 inches inside diameter with resultant decrease in down time, increased production, longer die life, greater accuracy and better finish for the product.

Continued downward trend of prices of cemented carbide tools has begun to have a marked effect on the general purpose use of such tools. Another contributing factor has been the trend toward standardization of tool designs for general use. This has progressed to a point where "standard" tools are being stocked—finish ground and ready for use—for immediate shipment. The design of such universal standard tools has been developed to a point where they will now cover 80 per cent of possible cemented carbide applications for boring, facing and turning.

Machine tool producers as a whole have been giving greater consideration recently to the problems of horsepower, power transmission, rigidity, and so on as required for greater utilization of carbide tooling. Hardly scratched as yet, but apparently imminent of development is the vast potential use of cemented carbides for reducing wear due to abrasion and corrosion. Until recently, applications in this direction were confined largely to solving "tough" wear-reduction problems. With the reduction in price of cemented carbides during the past two years, these materials become increasingly practicable for wider wear-resisting use.

DIFFUSION ALLOYING SEEN AS MOST LIKELY METAL POWDER PROCESS

BY GREGORY J. COMSTOCK
Associate Professor of Powder Metallurgy,
Stevens Institute of Technology, Hoboken, N. J.
Metallurgical Consultant for
Ekstrand & Tholand Inc., New York

■ IT IS now rather generally agreed that metal powder molding has at last been applied on a sufficiently large production basis to demonstrate that it is practical and that it possesses some, at least, of the many advantages forecast for it. Many industries are seriously considering the best means of setting up experimental facilities for determining the possibilities for themselves. During the past year, a dozen or more small semi-production metal powder departments have been installed with this end in view. More are either in the process of assembly or are known to have been definitely decided upon.

If dense heat treatable alloy powder products are to be generally made on a large industrial scale it appears reasonable to assume that they will be made by either diffusion alloying of mixed primary metallic powders and alloy powders, or directly from the alloy powders themselves. Present conception of diffusion alloying involves the use of the primary metallic powders, many of which are at present available in quantity, and what might very well be called master alloy powders—the concentrated alloy from which the diffusion is to proceed. The alternate practice requires the production of the ultimate alloy composition in powder form and involves particle-to-particle bonding, similar to that which is now employed in the production of the pure metallic powder products themselves. Diffusion alloying obviously introduces another and quite different set of bonding conditions. The compacting characteristics of the alloy powders alone may be expected to be different from those of the pure metal plus master alloy. In some cases this may very well present advantages, in others conceivably the reverse. The powder production costs which are involved in the diffusion alloying method will be that of the more or less established single pure metal powder plus the cost of the master powder alloy. The cost involved in the total alloy powder practice will be that of producing the alloy in quantity in finely comminuted form. There are, of course, many other differences between these two potential plans for the production of alloy parts from powders which might be mentioned.

Various master alloy powders are available at present in quantity and in a surprisingly great variety of compositions. Some have been produced by electrolytic co-deposition of the pure metals, others by diffusion alloying of uncompacted pure metal powders. Many unusual and interesting master powder alloys have been ingeniously produced by Dr. P. P. Alexander by the hydride process. From the availability stand point, diffusion alloying thus appears more favorable of the two methods for immediate experimentation, particularly in the nonferrous field where the precipitaiton hardening of powder products presents so many great possibilities.

DUCT CAPACITIES INCREASED BY THINNER, BETTER INSULATION

BY E. W. CLARK
Mechanical Engineer,
Wire and Cable Department,
General Electric Co., Schenectady, N. Y.

■ WIRE AND cable manufacturers now have processes which insure a much better surface on bare wire. One is a shaving process which mechanically removes the faulty outside surface. Another is an extrusion method which eliminates imperfections normally produced by hot rolling. An improved process of pickling and cleaning hot-rolled rods is still another method of obtaining a better surface. Apparatus manufacturers have welcomed these improved wire surfaces as it helps prevent costly failures and because less insulation can safely be used.

Chemistry is producing many new synthetic resins for enamels and varnishes which permit thinner insulating walls when applied as insulation on wire or cable. Also they offer greater resistance to abrasion, and are greatly resistant to the deteriorating effects of oil and oxidation. Rubber type synthetics are replacing natural rubber. Because of their physical and electrical qualities, thinner insulating walls can be used, braided and weatherproofed coverings can be eliminated to produce a much smaller outside diameter. This means that considerably more current can now be carried in the same duct space. Improved equipment for applying insulating tapes to cables has given increased insulating qualities and better power factor readings to both varnished cable and paper-insulated cables.

A new type paper-insulated gas-filled cable has been developed and is in successful operation. Various improvements in methods of insulating and treating paper insulated cables have been developed to give better electrical characteristics and longer life. Definite advances have been made in applying lead sheaths to cable so it is now possible to encase cable with a lead pipe absolutely free from included oxides and imperfect welds, and with extremely uniform wall thickness.

SEMIMACHINED FORGINGS STEP UP PRODUCTION OF FORGED PARTS

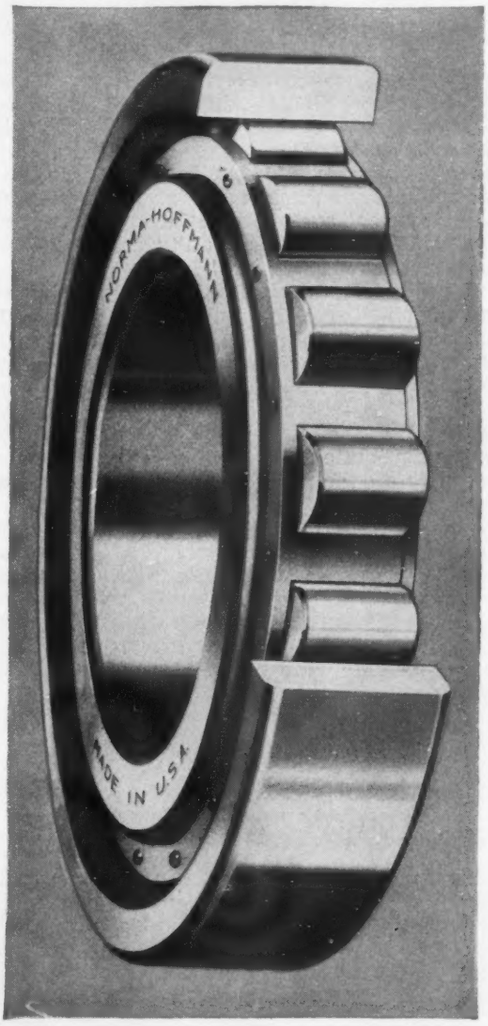
BY WALDEMAR NAUJOKS
Chief Engineer,
Steel Improvement & Forge Co., Cleveland

■ RAISING of the standard of quality for forgings to be produced in large quantities has necessitated many changes in normal forging practice. Such changes have been made through the entire production system and include attention from the time the forging bar or billet is cut to length till finished work is shipped. Inspections must be more frequent and exacting, heating more accurate, and laboratory control more rigid.

To improve quality on the increased production basis, a greater demand for semimachined and finish machined forgings has been in evidence. The advantages

WHERE NO OTHER ANTI-FRICTION BEARING WILL STAND UP

Picture to yourself the most difficult conditions a bearing can be called upon to meet — high speed, heavy load, temporary overload, shock, vibration. Then read below why NORMA-HOFFMANN PRECISION ROLLER BEARINGS — time-tested heavy-duty units — meet these conditions.



PARALLEL LINE CONTACT

Solid cylindrical rollers between cylindrical races providing maximum load contact area, increased steady load capacity, and a larger shock-absorbing capacity than any other type of single-row bearing.

SAFETY FACTOR

A margin ample for temporary overloads up to 50% beyond normal rating, as under peak loads, in unusually severe duty, or under shock conditions.

SUPERIOR CAGE

Made of extruded bronze to secure maximum density and uniformity, and machined all over for balance.

DURABILITY

Large contact area with the most efficient load distribution—greater wear-resisting surfaces—true rolling between rollers and raceways — minimum friction between roller and cage.

SPEED QUALITIES

A lower friction coefficient under heavy load than any other type of bearing—a speed ability equal to that of any ball bearing, size for size, up to 35,000 R. P. M.

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of such machining operations are two-fold: First, semi-machined forgings remove any underfilled or defective forgings from the finish machined stage and tend to eliminate scrap in the more expensive machining operations. Second, they tend to speed up the finish machining operations and make them more economical. With national defense paramount, it is necessary for the production forging industry to use all the experience and knowledge at its command to increase production and to obtain higher quality in the already high quality forgings of today.

OXYACETYLENE PROCESS MAY HELP AVOID DEFENSE BOTTLENECKS

BY H. E. ROCKEFELLER
The Linde Air Products Co., New York

■ MACHINE flame-cutting, already employed widely as a steel-fabricating method, should see greatly increased use in the coming year as a means of overcoming bottlenecks in producing machinery and products vitally needed for defense. A complete range of oxyacetylene cutting machines and improved cutting techniques now permit application to practically every metal-shaping need.

In the steel mill oxyacetylene deseaming and desurfacing operations aid the conditioning of semifinished steel since desurfacing machines incorporated in the rolling mill now removes defects from the material at rolling temperature and without interrupting production cycles. Increased production and improved quality result. A new portable oxyacetylene bar-cutting machine answers a great number of production cut-off problems. It employs a self-contained power unit with hydraulic motion and speed controls to provide smooth blowpipe movement and wide variation in cutting speeds. Another development which has gained recognition is oxyacetylene descaling. A series of closely spaced flames from manually or mechanically operated blowpipes quickly and economically remove scale.

Oxyacetylene gouging, which provides an inexpensive means for quickly removing a narrow strip of surface metal from steel plate, forgings and castings, is proving popular for the removal of defective welds, the grooving of plate edges in preparation for welding, and for maintenance and scrapping operations. In quantity production work, multiflame tips and mechanization of blowpipe movement are making oxyacetylene welding increasingly useful. A new vapor flux increases the inherent speed of bronze welding and makes it more valuable for repetitive work. This vapor flux is picked up by the gas, passes on through the blowpipe to the weld area. Since the process is automatic, only the required amount of flux is deposited at the exact point where it is needed, thereby speeding the welding considerably.

FULL ADVANTAGES OF WELDING IN BRIDGES AWAIT DESIGN CHANGES

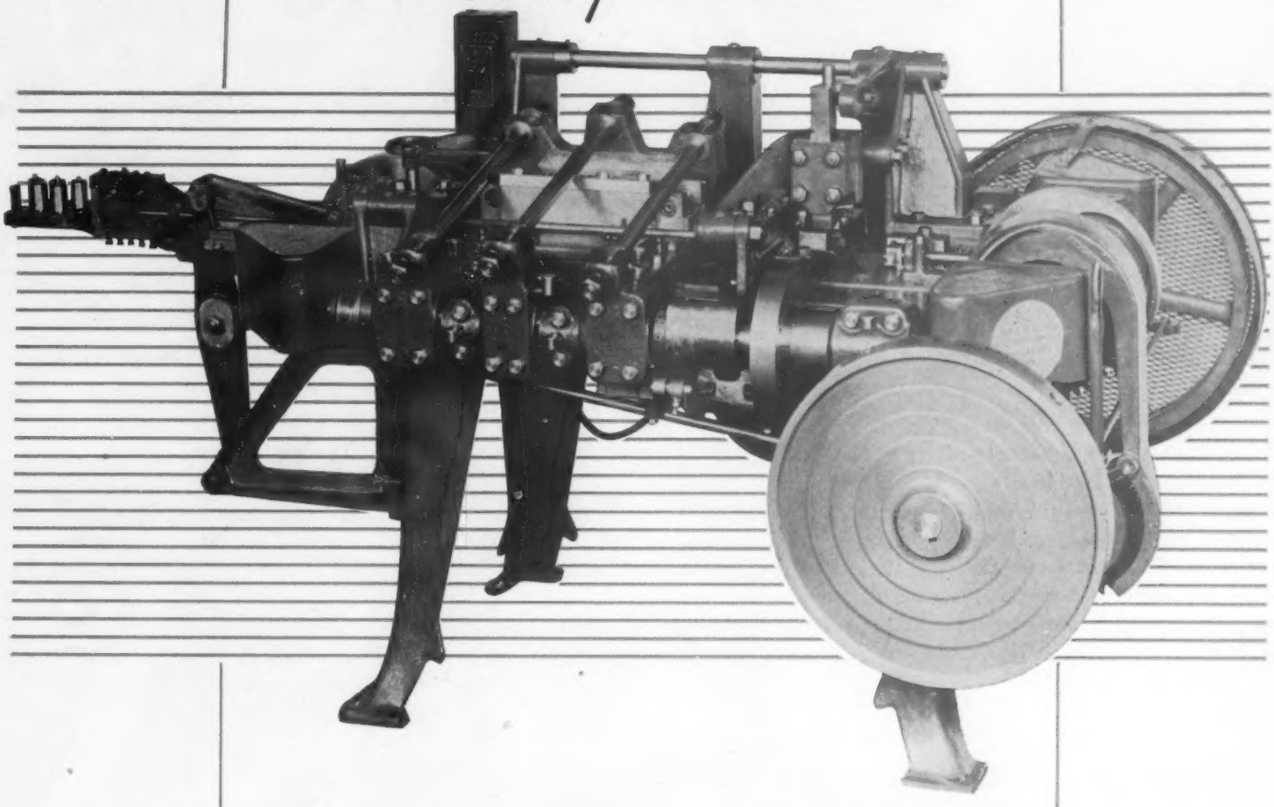
BY GEORGE T. HORTON
President,
Chicago Bridge & Iron Co., Chicago

■ EQUIPMENT and materials for welding steel have even now advanced sufficiently to believe that in the near future all metals will be welded. Further advances are constantly being made—alloy steels are in general use and special alloy linings in mild steel containers are proving their merit. Resistance welding will attain even greater importance with co-ordinated efforts to improve performance and efficiency. Incidentally, flame machining has aided welding considerably. Naturally, welding appealed from the start to builders of tank and plate metal structures where their product must not alone be structurally sound but also tight against leakage—always difficult in riveted work and nothing to be thought of in a welded job. Welding normally should be equally attractive to shipbuilders and some progress has been made. However, shipbuilding codes having the effect of laws must be modernized. For applications where added strength and ductility or reduced weight are of prime importance, for airplanes, automobiles, railroads, and all types of machinery, welding is an increasingly vital factor.

There is, of course, much room for improvement; much is still to be accomplished—research into fundamental problems, betterment of equipment, and improved methods of fabrication and assembly, to say nothing of design, acceptance of codes providing a common welding language, and increased emphasis upon supervision and inspection. Many engineers fail to realize that quite radical changes in design may be necessary before the full advantage of welded construction can be attained. Welding is not as yet much used in the construction of buildings and bridges, and the above statement is made with these particular opportunities in mind. We in the welding industry are fortunate because new problems requiring individual treatment continually arise. So long as this is true, welding will advance. It is to be hoped that many years will elapse before welding reaches that unfortunate static stage where no problems remain.

Of the newer welding techniques, the Gaylord process for arc welding galvanized steel is finding increased application. Here a heat interchanger weighing 8 tons is being constructed entirely of galvanized sheets and plates by the process

NILSON *Automatic* WIRE AND METAL *Forming Machine*



● The first NILSON STOCK FORMING MACHINE was built over 50 years ago. It was a clumsy affair compared with the sleek models NILSON makes today, but it served its purpose. From this start NILSON went on to build machines for forming wire and metal parts, and the accumulated experience gained over a period of more than half a century is reflected in new records in speed and uniformity of products.

● The NILSON four-slide forming machine illustrated here is a motor driven unit, with power operating wire feed transmitted through a straight line. The open construction of the press and forming tools permits access and visibility, and the patented slide feed has an independent cam-operated wire gripping device.

● NILSON machines are guaranteed throughout. They are made for speedy and accurate production, with an eye toward the reduction of manufacturing costs.

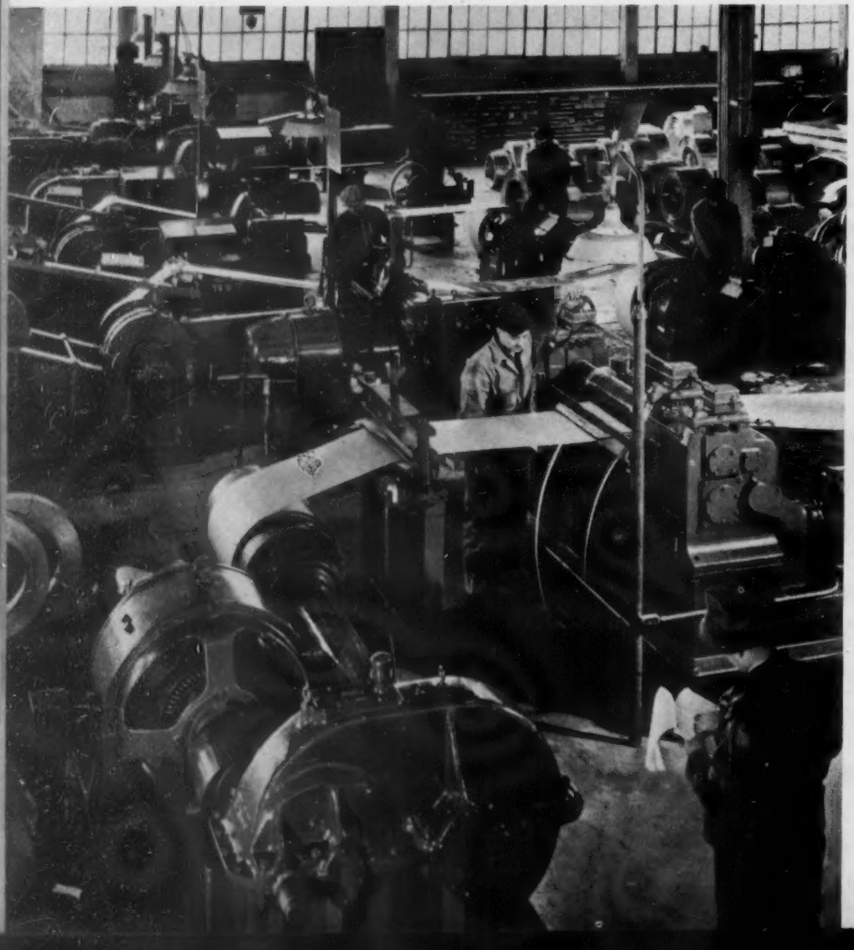
THE *A. H. Nilson* MACHINE CO.

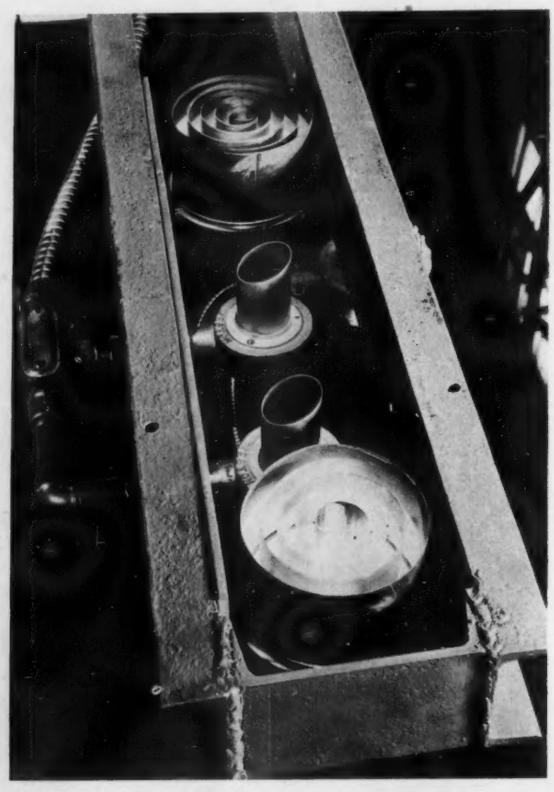
BRIDGEPORT — — — CONNECTICUT

PROGRESS IN METALS Told Pictorially

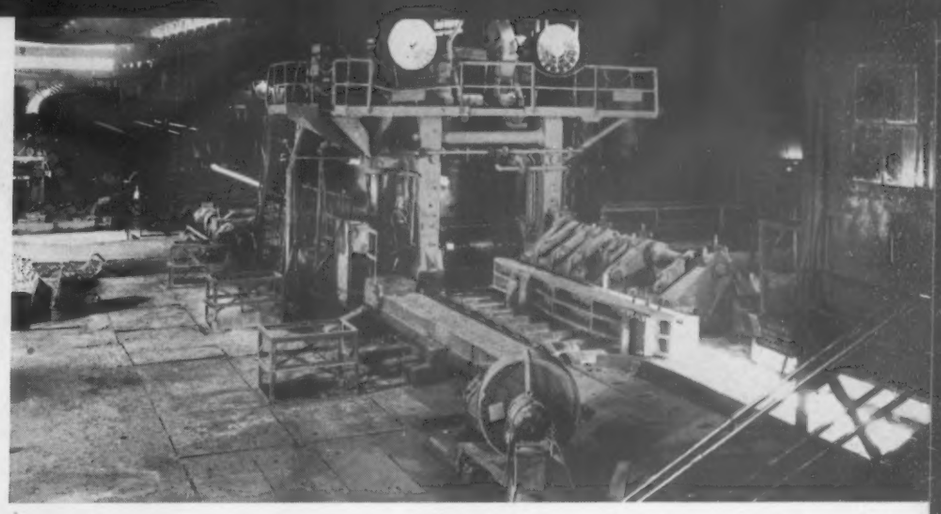
All-welded tanks for airplane refueling units permit larger capacities and assurance against leakage. Now tanks can be welded of practically any metal and soundness of joints assured in advance. This milk tank of stainless is typical

Expanding stainless applications have caused one large producer to enlarge facilities to occupy all wings of a 5-acre building with a capacity of 1200 tons monthly. Below is view in coil trimming and slitting department. Here coils are trimmed to exact dimensions and slit into narrow widths for use in automobile molding, interior and exterior building decorations, home and hospital utensils and for hundreds of other applications

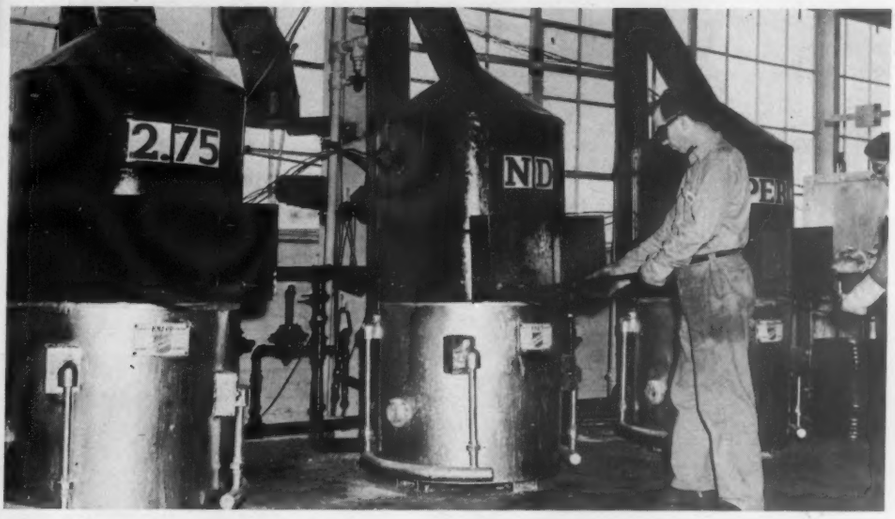




Automatic controls now handle amazingly complex operations. Above unit automatically governs and times feeding of slabs to a breakdown mill by means of photo-electric relays. New bar enters rolls only after its predecessor has moved out. Result is increased speed, assurance against jamming



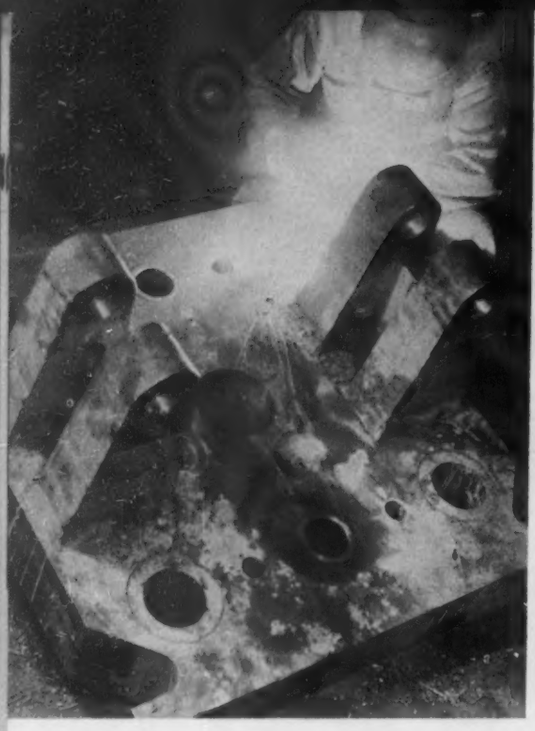
At right is portion of a new South Chicago mill with 40-inch blooming mill in foreground and a 32-inch blooming mill and 21-inch continuous mill in perspective. It is interesting to note some continuous mills are already exceeding their calculated capacity



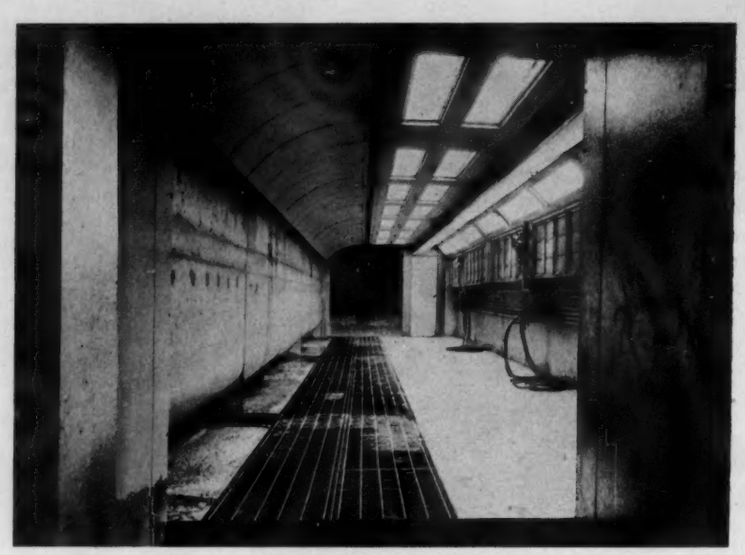
Heat-treating line at western aircraft plant is shown at left. Here from left to right are furnaces for drawing, for non-decarburizing hardening, for liquid carburizing—all with salt baths. Work is mostly bolts, rivets, struts, dies and other small parts

Induction hardening, advancing rapidly, is employed by a tractor manufacturer to give high surface hardness to track rollers as shown at right. These units permit one operator to harden 30 assemblies per hour—power consumption is only 51 kilowatt-hours per hour

Welding permits unusual design of roof trusses shown at left in new $500,000 plant in Detroit devoted to manufacture of hydraulic pumps and controls for aircraft, machine tools and ordnance work. Note lofty unobstructed headroom provided

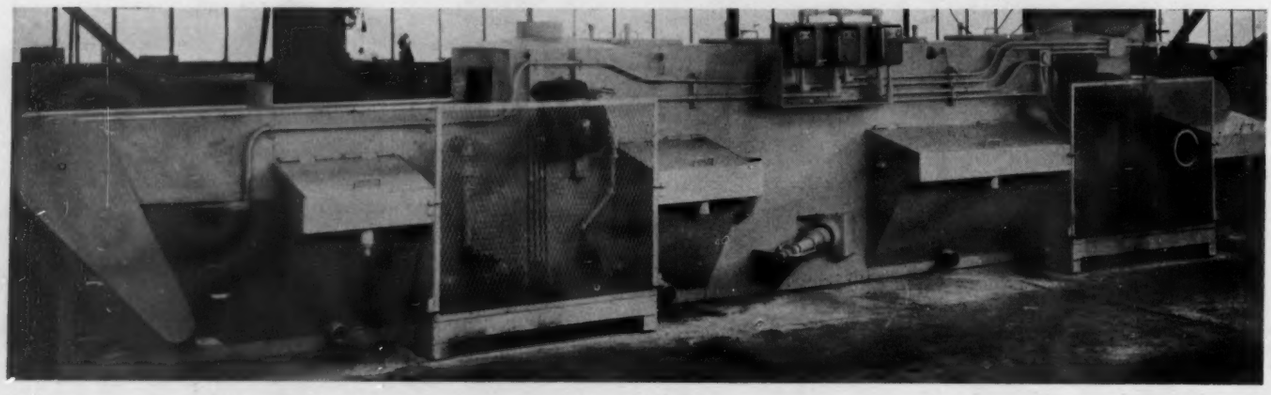


Welding die plate, above, for all-welded diecasting machine that cuts maintenance costs, permits greater output due to sturdier, more rigid machine thus produced



Above is view in new assembly plant installation in the middle west showing latest in auto finishing. Water-wash spray booths clean exhaust air, filters clean supply air

Below, installation of newest type metal cleaning machine for kerosene spraying, washing and rinsing bearing races. This continuous automatic setup has extremely large capacity



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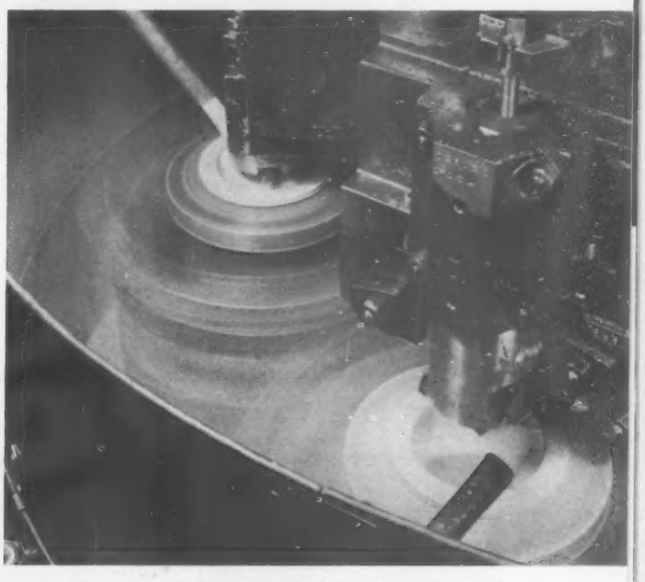
Pfaudler Co., Rochester, N. Y.; Pittsburgh Lectromelt Furnace Corp., Pittsburgh; Pyrometer Instrument Co., New York; Quigley Co. Inc., New York; N. Ransohoff Inc., Cincinnati; Republic Steel Corp., Cleveland; Revere Copper & Brass Inc., New York; J. O. Ross Engineering Co., New York; Jos. T. Ryerson & Son Inc., Chicago; St. John X-Ray Service Inc., Long Island City, N. Y.; St. Joseph Lead Co., New York; Spencer Turbine Co., Hartford, Conn.; Standard Steel Spring Co., Coraopolis, Pa.; Surface Combustion Corp., Toledo, O.; C. J. Tagliabue Mfg. Co., Brooklyn, N. Y.; Taylor-Winfield Corp., Warren, O.; Thomson-Gibb Electric Welding Co., Lynn, Mass.; Una Welding Inc., Cleveland; Vaughn Machinery Co., Cuyahoga Falls, O.; Welding Equipment & Supply Co., Detroit.

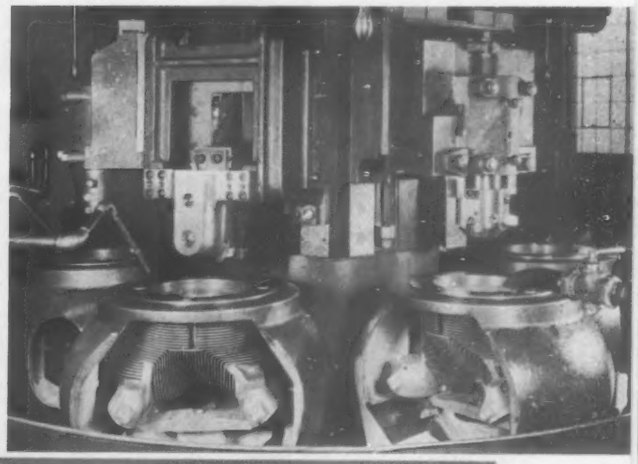
Wellman Engineering Co., Cleveland; Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.; Wickwire Spencer Steel Co., New York; Wisconsin Steel division, Worth Steel Co., Claymont, Del.; Wyatt Metal & Boiler Works, Houston, Tex.; Youngstown Welding & Engineering Co., Youngstown, O.

One of the expanding uses of aluminum is exemplified in this sleek new Greyhound cruiser with its horizontal aluminum fluted sides—one of 400 buses recently built

New brass mill employs extensive materials handling facilities. The metal travels on specially designed gravity conveyors to and from rundown mill, annealing furnaces, pickling and cleaning units, and the like



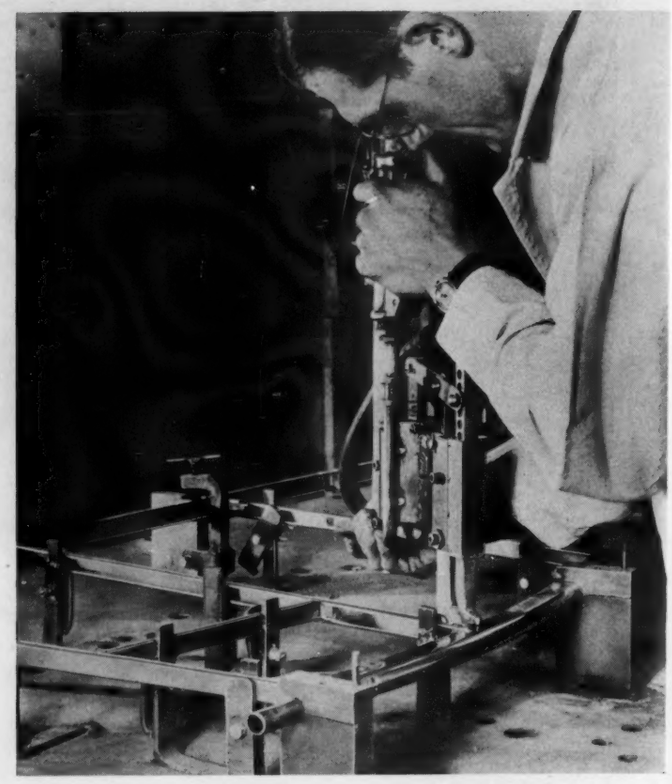
Machines like this 16-inch 6-spindle automatic working are a familiar sight in many airplane plants and others doing precision mass production work on items for national defense. Above, unit is seen in operation; below, workholders are stationary



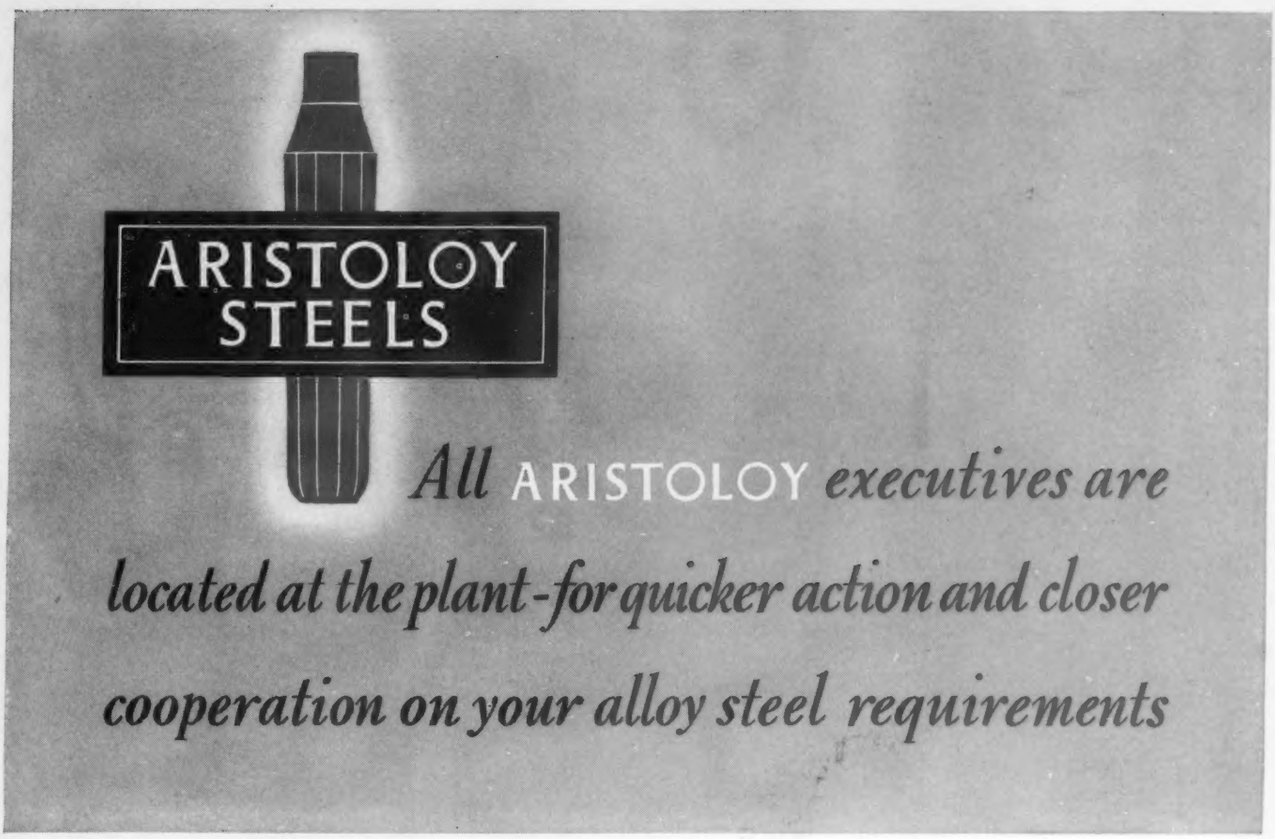
PROGRESS IN METALS
Told Pictorially

Pure electrolytic manganese, available only in small lots a year ago, now is shipped by the ton. Each drum above contains 250 pounds of manganese metal that is purer than "spectroscopically pure" manganese formerly imported at $2.50 per pound, now made and sold here at a few cents per pound

New muffle-type furnace, below, carburizes 350 pounds of gears per hour. Case is 0.025-inch, temperature 1700 degrees Fahr., time 6 hours. Muffle is 21 inches wide, 15 inches high, maximum loading height on trays is 12 inches. Trays and gears are quenched in oil automatically. Temperature control handles three zones as separate units



Typical of materials and methods now being widely used in production of many aircraft parts is the "shotwelding" of this airplane stabilizer—resistance welding stainless steel parts together


ARISTOLOY
STEELS
All ARISTOLOY executives are
located at the plant-for quicker action and closer
cooperation on your alloy steel requirements

WE TALK IT OVER ACROSS THE DESK . . . NOT ACROSS THE COUNTRY

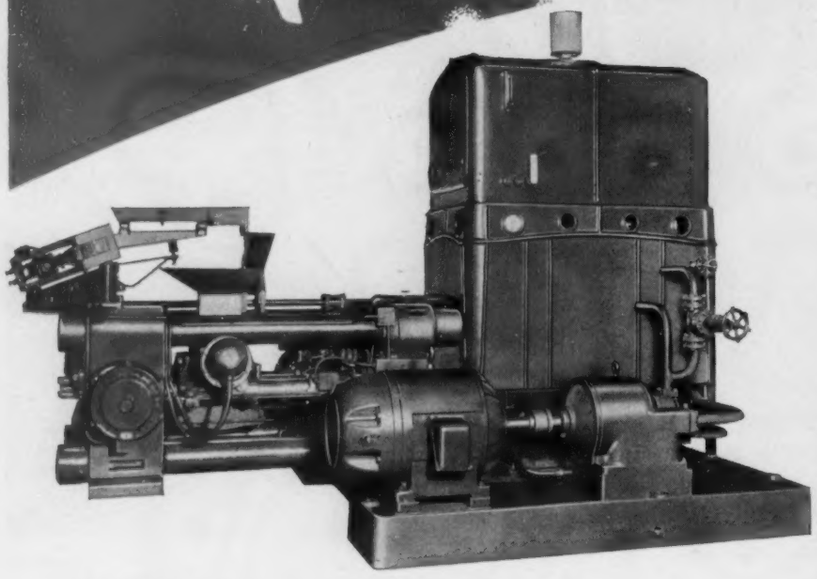
All Aristoloy Executives and Department Heads have their working headquarters where Aristoloy Steels are made—at our Warren, Ohio plant. Talking it over across the desk, there's an easy, every-day interchange of information and experience. Centralized organization makes for closer cooperation, with less chance for error, delay, and misunderstanding. Aristoloy steel makers make steel *on the job* — not by remote control.

COPPERWELD STEEL COMPANY, WARREN, OHIO

Visit us at the
METAL SHOW
October 21-25, 1940
CLEVELAND, O.
Stop at our Aristoloy Exhibit—Booth F-20—and play "Aristoloy". You can't lose.
Prizes for high scores

ARISTOLOY S.A.E. ALLOY BILLETS AND BARS; AIRCRAFT QUALITY STEELS; OXIDATION AND CORROSION RESISTING STEELS; TOOL AND SPECIAL STEELS; STAINLESS STEELS

Conserve National Resources!



Advantages of:

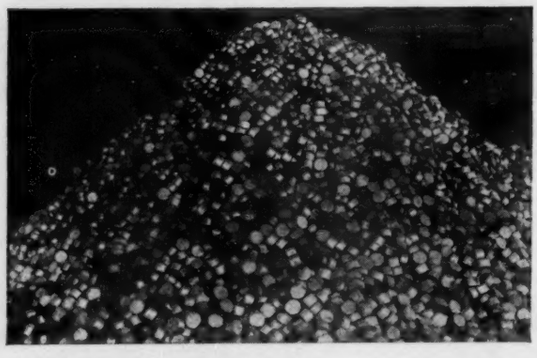
BRIQUETTING
Borings and Turnings

1. **SUBSTANTIAL SAVINGS** by replacing a higher price scrap.
2. **CLOSER METAL CONTROL** because briquettes are composed of a clean machineable metal of known analysis.
3. **MINIMUM METAL LOSS** because of uniform size and density of briquettes.
4. **CONSERVATION OF SPACE.** Materials are used up daily.

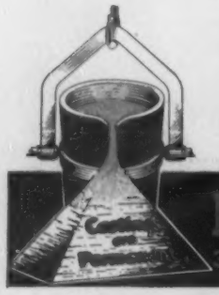
The Highest Percentage of Usable Material is Obtained by Melting Borings and Turnings in a BRIQUETTED Form . . . .

Milwaukee Hydraulic Briquetting Presses convert borings and turnings into BRIQUETTES at the lowest possible processing cost. These BRIQUETTES are now being used by many of the leading manufacturers to replace the highest grades of metal scrap. It will pay you to investigate what Milwaukee Briquetting Presses can do for YOU. Capacities range from ¾ ton to 4 tons per hour.

Cast iron briquettes from a Milwaukee Hydraulic Briquetting Press. Handled with magnet to material yard, ready for remelting in the cupola. Note uniformity.



Check Your Tonnage

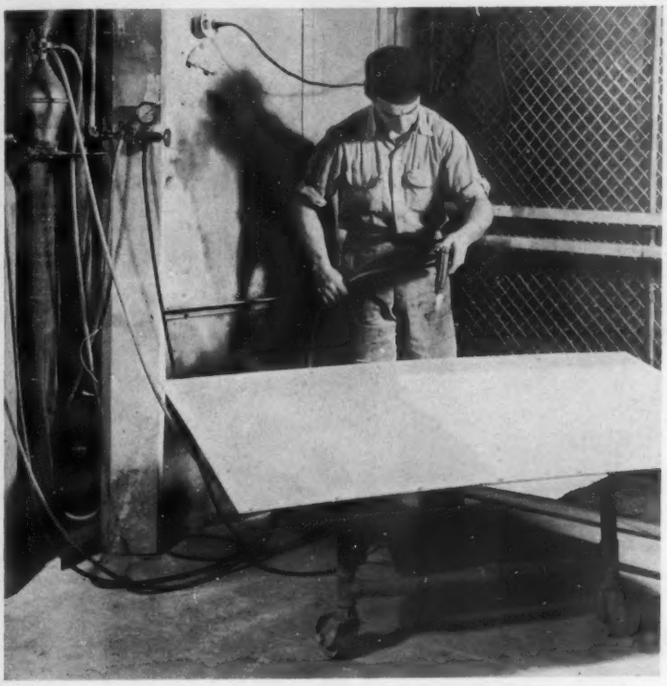


Why not check over your own annual tonnage of metal borings and turnings in order to determine the possibility of salvaging it economically? Our engineers will gladly assist you and furnish you with a complete proposal covering your specific requirements. Write us—today.

MILWAUKEE FOUNDRY EQUIPMENT CO.
3238 WEST PIERCE STREET • Cable Address: MILMOLDCO • MILWAUKEE, WISCONSIN

A 3203-1 P-C

Below, originating in Europe and employed extensively by England in the current war, the Schori pistol is assuming increasing importance for spraying molten metal. Here metallic zinc powder is being sprayed. There are no thickness limitations, nor is any surface too large. The coating may be applied before or after fabrication



Controlled quality is typified by the above view. Here a careful check of the steel heat is being made. Checks at every step in steelmaking with more and more automatic controls make better quality easier to obtain and to hold in modern mills

At lower right is one piece of new dairy equipment illustrating rapid acceptance of stainless steel in that industry. It is now possible to get a No. 7 finish on arc welded joints in stainless

Below, new automatic heat-treating furnace anneals high silicon steel sheets for transformer cores in a controlled dry-nitrogen atmosphere—dew point is minus 40 degrees Fahr.

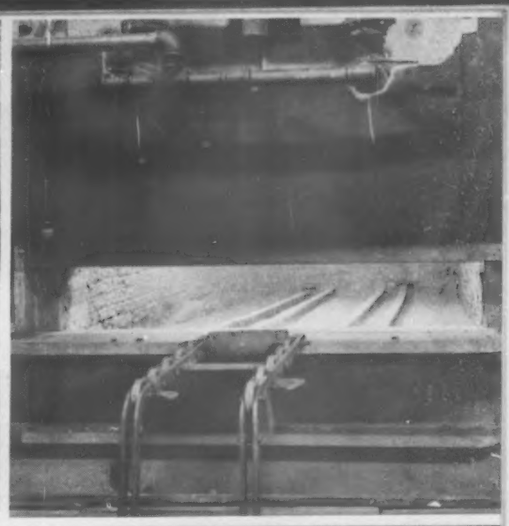
Super Refractories by Carborundum

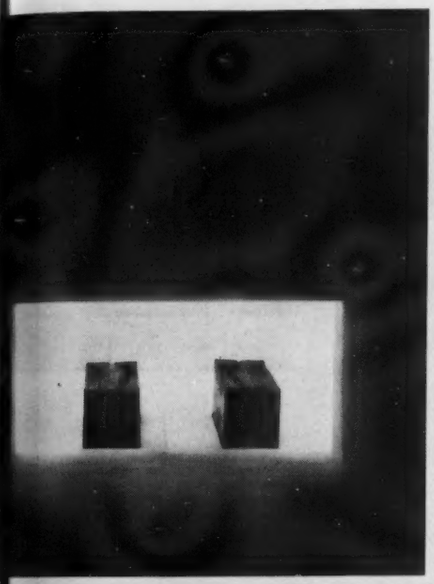
THE HEATING PROBLEMS OF THE METAL

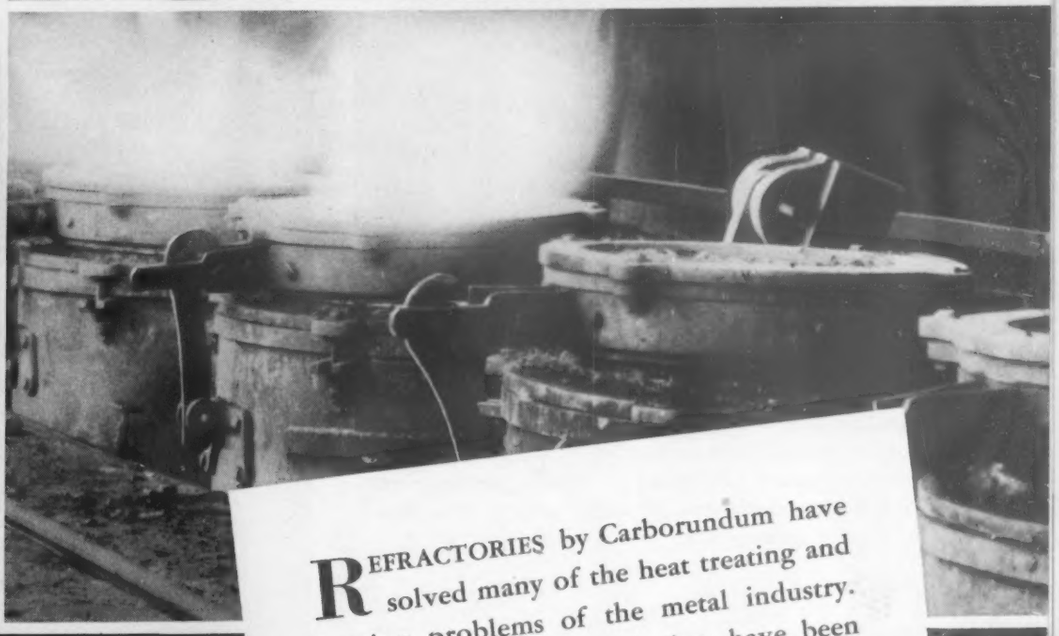
THE CARBORUNDUM COMPANY

REG. U. S. PAT. OFF.

...nelp solve
...A INDUSTRY







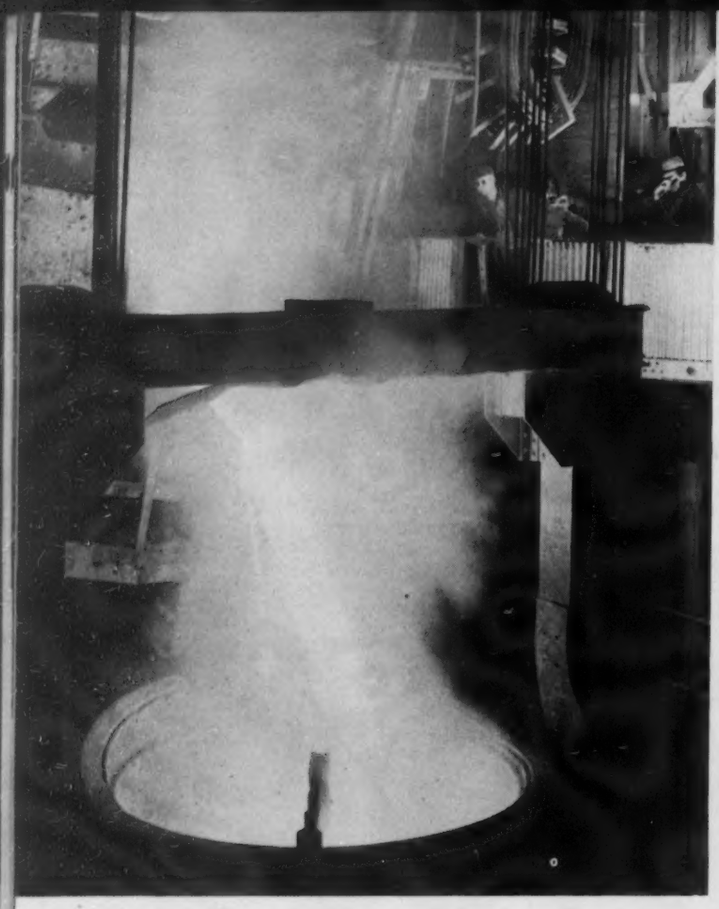
REFRACTORIES by Carborundum have solved many of the heat treating and heating problems of the metal industry. The many uses to which they have been put are too numerous for complete listing, but these are representative: *Stainless steel annealing furnaces . . . Ferrous and Non-Ferrous Melting Furnaces . . . Tungsten and tungsten carbide heat treating and production furnaces . . . Special atmosphere furnaces for alloy steels . . . Forging furnace arches and walls . . . Drawing, tempering, hardening and carburizing furnaces.* Refractories by Carborundum probably can reduce the costs, speed up the production or better the quality of your own product. Our representatives will be glad to discuss your particular heat treating problems with you.

District Sales Branches: Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh.
Distributors: McConnell Sales and Engineering Corporation, Birmingham, Ala.; Christy Firebrick Company, St. Louis, Mo.; Harrison & Company, Salt Lake City, Utah; Pacific Abrasive Supply Company, Los Angeles, San Francisco, Calif.; Denver Fire Clay Co., El Paso, Texas; Smith-Sharpe Company, Minneapolis, Minn.

{Carborundum, Carbofrax, Alfrax and Mullfrax are registered trade-marks of and indicate manufacture by The Carborundum Company}

CARBORUNDUM

REFRACTORY DIVISION, PERTH AMBOY, N. J.



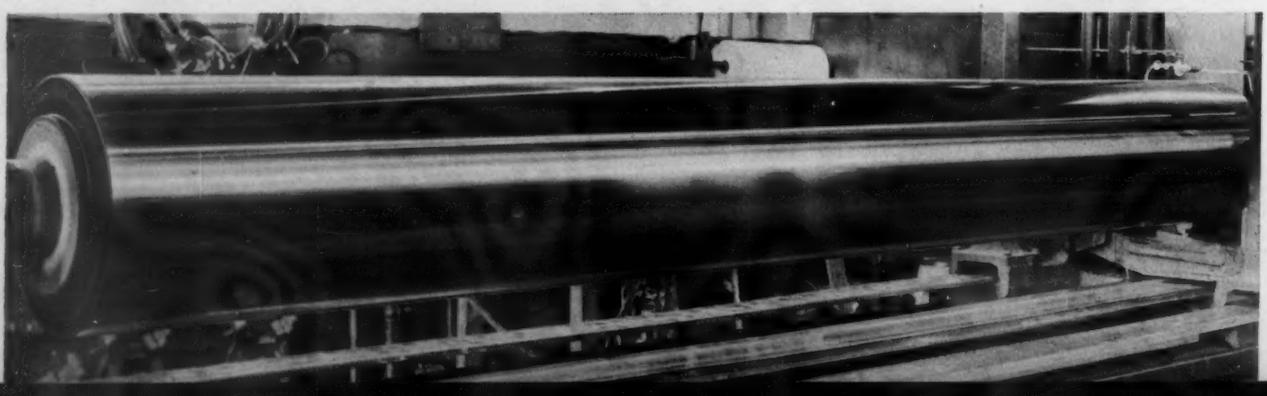
Rapidly increasing demand for stainless steels has caused producers to expand facilities. Here is 50-ton electric furnace just added to produce stainless and other alloy steels—one of eight units at this plant making alloy steels exclusively

PROGRESS IN METALS *Told Pictorially*

Tapping a newly developed metallic zinc condenser in production of zinc by a patented electro-thermic process. Condenser is 14 feet long, carries 12-ton metal bath, produces 15 tons zinc daily, 1500 pounds each time it is tapped

New copper and brass mill employs continuous pickler, scrubber, washer and dryer, arranged in two decks to hold down floor space

Highly finished monel-covered press roll, 24-5/16-inches diameter, 207 inches long, ground with crown of 0.016-inch. Original thickness of the monel cover after application was ¼-inch but 1/16-inch was removed by the grinding and polishing operations



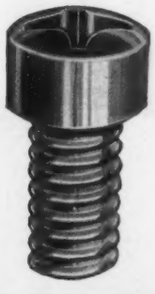
PRODUCTION HAD TO BE TRIPLED!

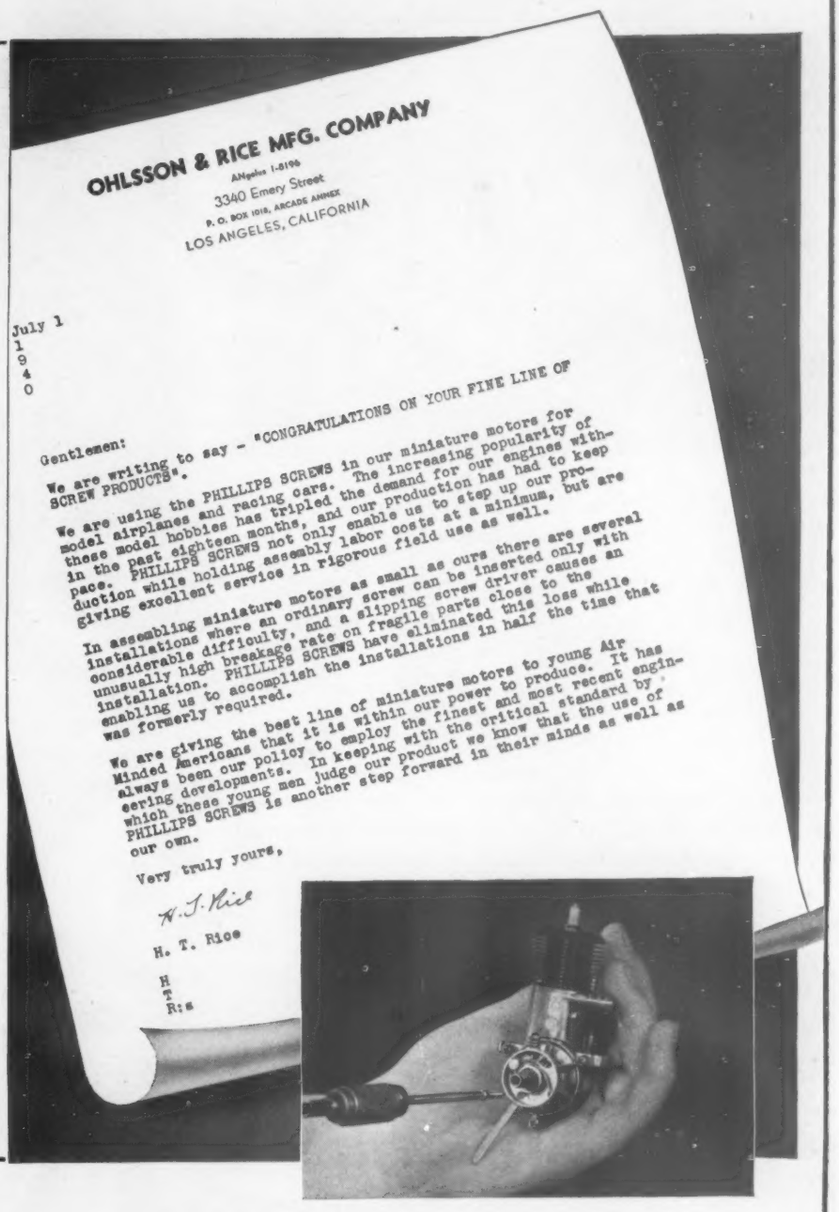
So They Use Phillips Screws to Cut Assembly Time

They *stepped up production* yet *kept down assembly labor costs* by changing over to Phillips Screws . . . when increasing popularity tripled the demand for their product.

Miniature airplanes, as well as the latest military and commercial giants of the air, are now being assembled faster and tighter with Phillips Screws. Also look at the newest cars, refrigerators, furniture! In a wide variety of industries today manufacturers are discovering *it costs less to use Phillips Screws.*

Why not investigate? Write to one of the firms listed below for complete information—telling where and how *you* can cut assembly time and costs in *your* particular industry.





OHLSSON & RICE MFG. COMPANY
ANgelus 1-8196
3340 Emery Street
P. O. BOX 1018, ARCADE ANNEX
LOS ANGELES, CALIFORNIA

July 1
1
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4
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Gentlemen:

We are writing to say - "CONGRATULATIONS ON YOUR FINE LINE OF SCREW PRODUCTS".

We are using the PHILLIPS SCREWS in our miniature motors for model airplanes and racing cars. The increasing popularity of these model hobbies has tripled the demand for our engines within the past eighteen months, and our production has had to keep pace. PHILLIPS SCREWS not only enable us to step up our production while holding assembly labor costs at a minimum, but are giving excellent service in rigorous field use as well.

In assembling miniature motors as small as ours there are several installations where an ordinary screw can be inserted only with considerable difficulty, and a slipping screw driver causes an unusually high breakage rate on fragile parts close to the installation. PHILLIPS SCREWS have eliminated this loss while enabling us to accomplish the installations in half the time that was formerly required.

We are giving the best line of miniature motors to young Air Minded Americans that it is within our power to produce. It has always been our policy to employ the finest and most recent engineering developments. In keeping with the critical standard by which these young men judge our product we know that the use of PHILLIPS SCREWS is another step forward in their minds as well as our own.

Very truly yours,

H. T. Rice

H
T
Ris

PHILLIPS RECESSED HEAD SCREWS...

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS
SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

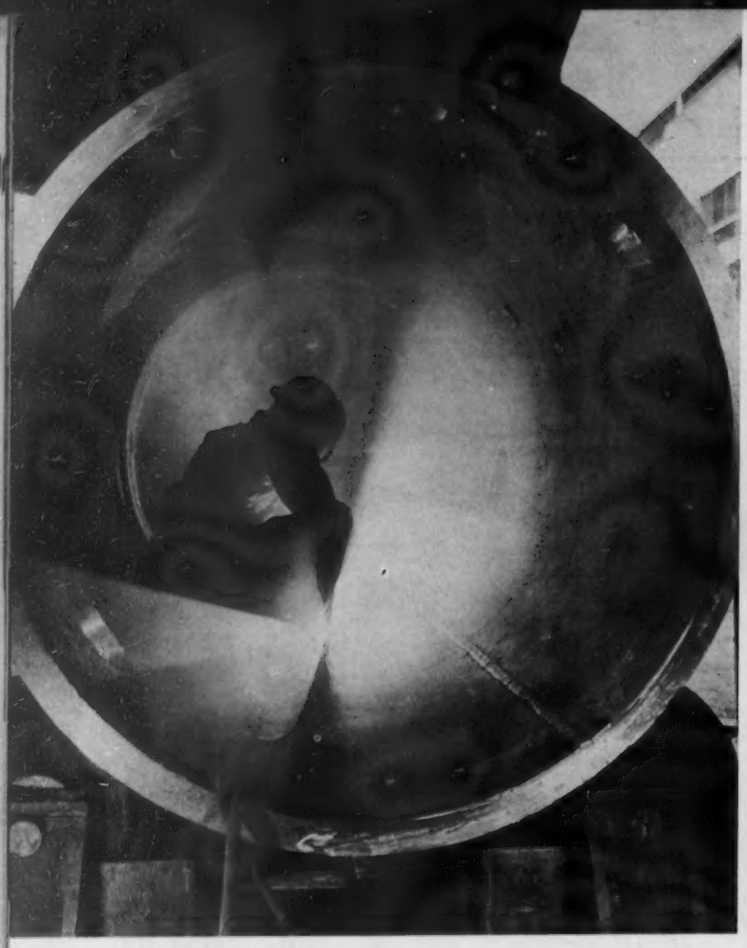
U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

Speed Product Deliveries by Cutting Assembly Time

American Screw Co., Licensor, Providence, R.I.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corporation, New Britain, Conn.

The Lamson & Sessions Co., Cleveland, Ohio
National Screw & Mfg. Co., Cleveland, Ohio
Parker-Kalon Corporation, New York, N. Y.
Pheoll Manufacturing Company, Chicago, Illinois

Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Lock Washer Co., Chicago, Ill.

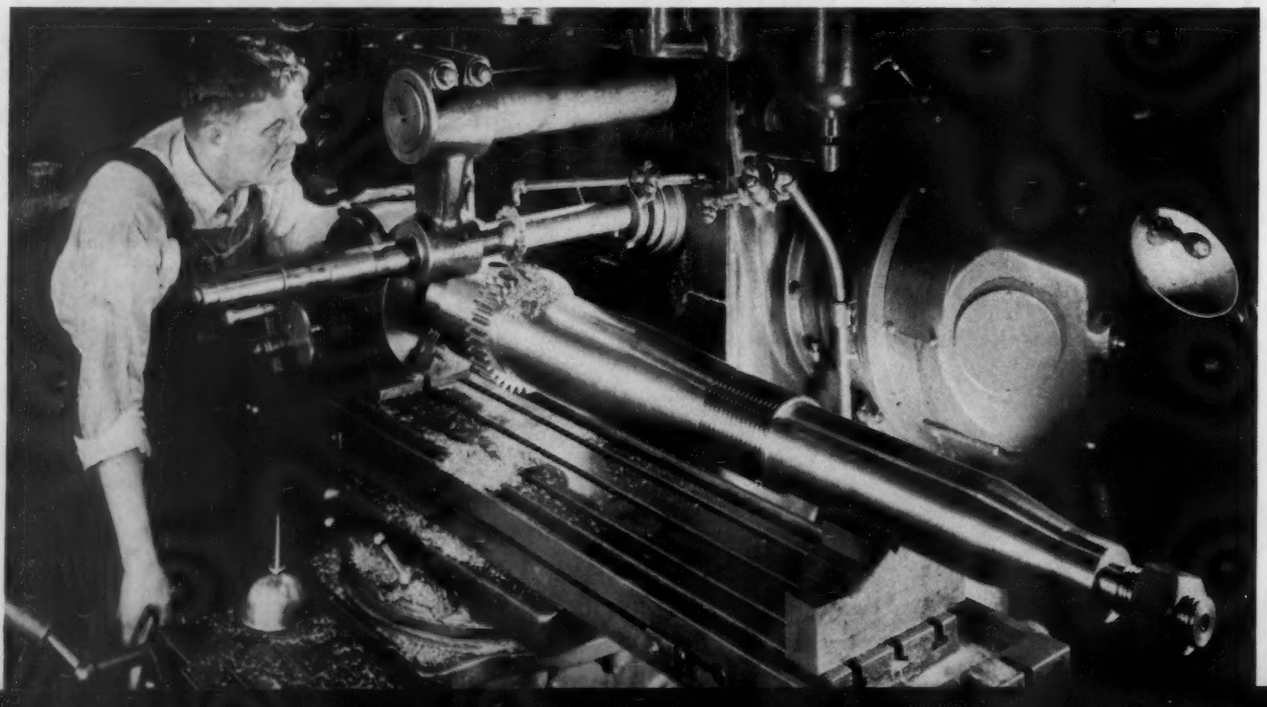


ASTM specification A-150, grade B, firebox steel with tensile strength of 70,000 to 82,000 pounds per square inch being welded from 3-inch plate to form an absorber unit, a pressure vessel for one of the new recycling plants which have proved so highly successful in last 18 months

PROGRESS IN METALS *Told Pictorially*

Because stainless resists rust, tarnish, corrosion and high temperatures, is not affected by food acids, and can be highly polished, welded, deep drawn, stamped, formed, machined to close limits, rolled and even colored, its use is expanding rapidly. Here is slitter unit at greatly enlarged stainless finishing plant of one producer

Remarkable machining qualities of certain new alloy steels are demonstrated here where a new chromium-nickel-molybdenum alloy of special composition is being machined at a hardness of 477 brinell on ordinary equipment. No filing or grinding is required after machining



MIDVALE *Craftsmen*

"AS FINE AS A HAIR" was once a measure of accuracy. Modern industry makes it essential that large moving parts have an accuracy far surpassing that—almost microscopic. Midvale craftsmen constantly must meet requirements of precision as close as in a watch—and successfully do.

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA, PA.

OFFICES: ***New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco***

REFRACTORY CONCRETE SPEEDS LINING, CUTS HEAT LOSS ON THIS JOB!

● Inside and outside views of 12-ft. annealing furnace cover of this steel works, showing Refractory Concrete lining, made with Lumnite. This job was done quickly and easily. No joints to leak heat. Plenty of strength to resist the hard knocks these covers get.

OPERATORS in this steel works lined their circular annealing furnace covers with Refractory Concrete. Result? A quick, low-cost job. A monolithic lining with no joints to leak heat . . . and with plenty of strength to resist the hard knocks these covers get day in and day out.

This steel works has used Refractory Concrete made with Lumnite for 5 years on annealer roof sections, door linings for core ovens and heating furnaces, tops of annealing cars —wherever they wanted to save time and money on refractories.

What is Refractory Concrete? It's a special-type concrete combining high cold-strength with structural strength even after long exposure to high furnace temperatures. Refractory Concrete is made by mixing Lumnite—a heat-resistant binder—with refractory, heat-resistant, or insulating aggregates—their choice depending on the need.

How Refractory Concrete can save you money! Lumnite Refractory Concrete is highly adaptable. It is easily placeable even in hard-to-get-at positions, thus cutting masonry costs. Refractory Concrete forms a solid one-piece wall. The smooth, streamlined surface cuts down erosion. No joints to catch and tear . . . to waste heat.

Why Use Refractory Concrete?

1. Cast-in-place, monolithic, adaptable, cold-setting. Applied like concrete.

2. Heat losses reduced by elimination of joints. Result—fuel economy.

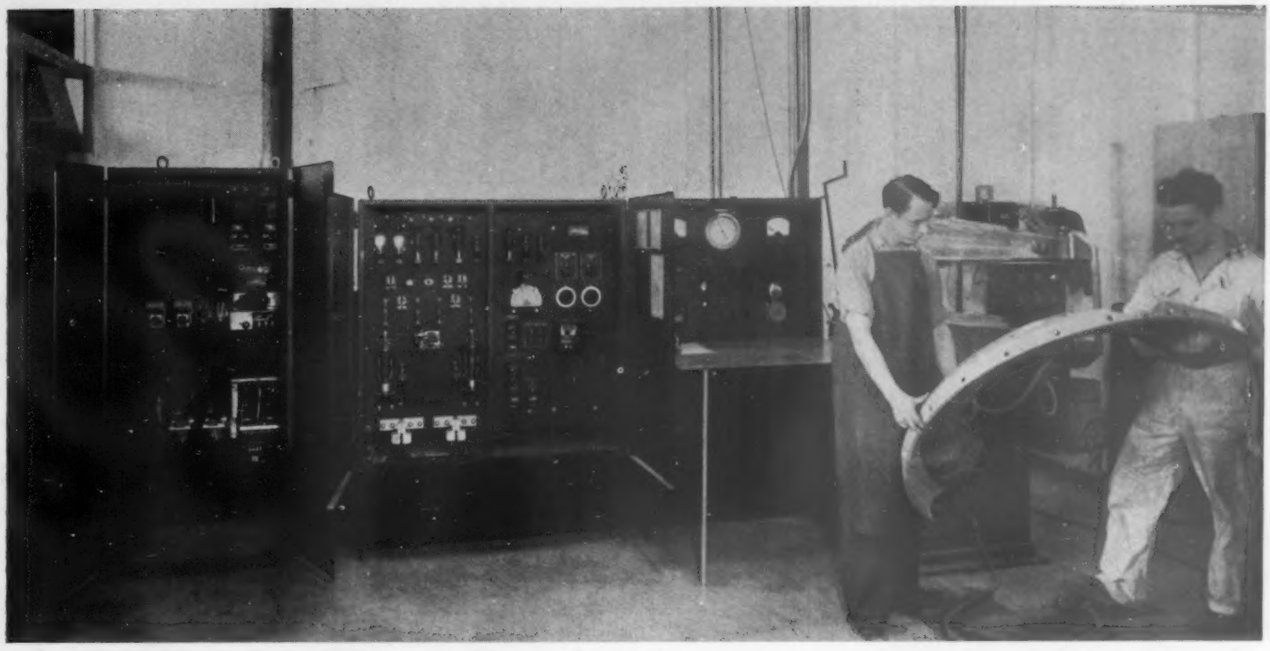
3. Insulating refractories at cost of ordinary refractories—or less.

4. Special shapes made in 24 hours. Precast shapes made as needed, cutting inventory expense.

Try Refractory Concrete made with Lumnite. You can get Lumnite from building supply dealers in all parts of the country. It comes to you in multi-wall, water-proofed paper bags.

For more facts on Lumnite, write Atlas Lumnite Cement Co. (United States Steel Corporation Subsidiary), Dept. S-7, Chrysler Bldg., N. Y. C.

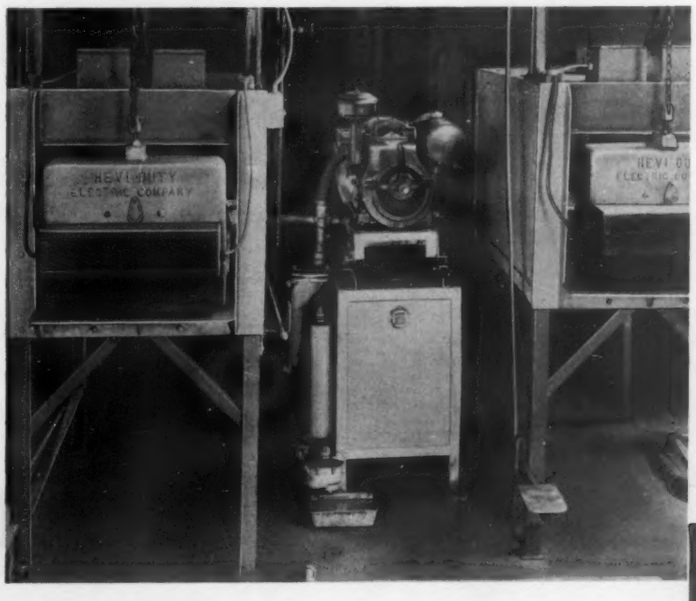
LUMNITE FOR REFRACTORY CONCRETE

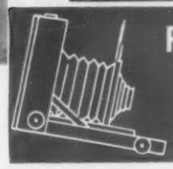


Resistance welding is playing an increasingly important role in aircraft work. Above, close control of welding heat is assured by new thyratron tube welding control at left—here used in spot welding an aluminum engine cowling

Of the newer materials being employed in aircraft parts, the hub below for a large airplane wheel of dowmetal—here being machined at high speed—indicates the trend towards lighter, stronger alloys

New method of obtaining protective atmosphere for furnaces utilizes exhaust gases from a simple internal combuston engine, below. Produced at high explosion temperatures, they are dried and delivered to furnace. Carburetor setting is charted to give exhaust gases with analysis variable as desired. Reports indicate method advantageous for high speed steels and others in which decarburization, carburization or scaling often are difficult factors to control





PROGRESS IN METALS

Told Pictorially

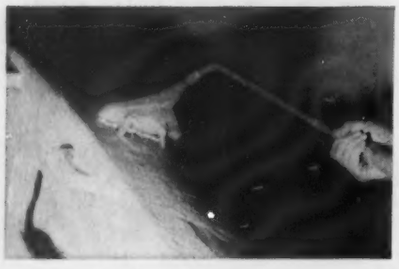
You can learn more about these

LINDE PRODUCTS AND PROCESSES

at the National Metal Exposition

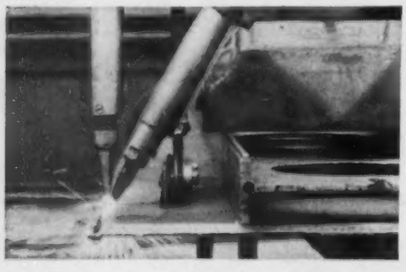
IN CLEVELAND, OCTOBER 21-25

The metal-working industry is effectively using these Linde processes to help expand plant capacity, to speed production, and to lower costs. You can learn more about these processes, and the apparatus used to apply them, at Exhibit Area D-14, National Metal Exposition.



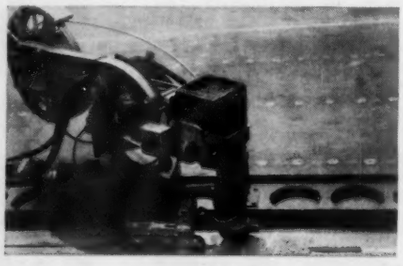
FLAME-CLEANING

Oxy-acetylene equipment can be used to remove scale from structural steel, castings, or forgings—quickly and economically. *Applied to metal before painting, this process helps prevent flaking of the paint at a later date.*



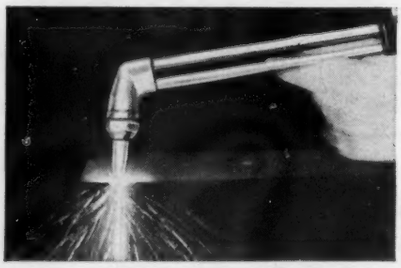
MACHINE FLAME-CUTTING

This process makes possible the rapid and economical production of steel shapes from stock of practically any commercially used thickness—or from stacks of plate. It is effectively used, too, for plate-edge preparation, prior to welding. For work on the job, small portable machines are available. For shop fabrication, larger stationary machines are often used advantageously. *This process is particularly valuable because you can avoid delays by fabricating what you need as you need it from stock steel.*



UNIONMELT WELDING

This remarkable electric process—available only from Linde—makes high-quality, one-pass welds in thin or heavy metal at remarkable speeds, with no flash, glare or sparks. It is particularly well adapted to production of derrick booms or other heavy structural members, fabrication of pressure vessels, fabrication of large diameter pipe, and similar work. *The "human element" is removed as a factor in getting good welds with Unionmelt welding, because once started, the weld progresses automatically.*

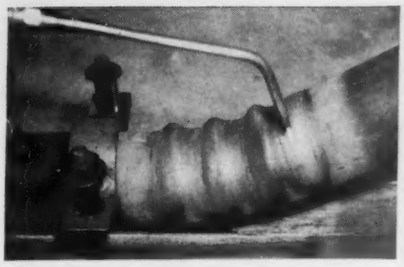


HAND-CUTTING

This process is used for cutting structural members to length, for scrapping operations, for cutting off concrete reinforcing bars, for cutting pipe, and for producing small steel parts used in maintenance and fabrication work. *With special nozzles, rivet removal by flame-cutting is made safer, faster, and less expensive.*

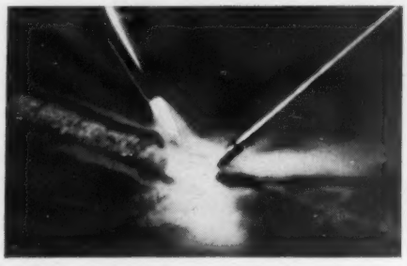
LINDE OXYGEN, HYDROGEN, NITROGEN • PREST-O-LITE ACETYLENE • UNION CARBIDE

The words "Linde," "Prest-O-Lite," "Union," "Oxweld," "Prest-O-Weld," "Purox," "Haynes Stellite," and "Unionmelt" are trade-marks.



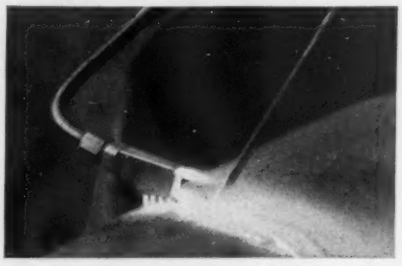
HEATING AND BENDING

The intense, easily-controlled heat of the oxy-acetylene flame makes it valuable for bending, straightening, and forming. *Wrinkle-bending, for example, produces smooth, sweeping pipe bends, without thinning the pipe wall or creating internal obstruction to flow.*



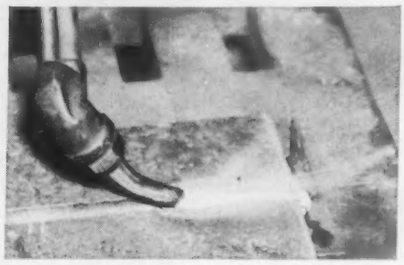
OXY-ACETYLENE WELDING

Because the oxy-acetylene flame is the hottest known, practically any metals—similar or dissimilar—can be joined so that the welds are stronger than the base metals themselves. *This universal process saves hundreds of thousands of dollars annually in maintenance and repair work alone.*



LINDEWELD PROCESS

Pipe or heavy plate can be joined by this process with impressive savings of time and materials. It is applied with an easily learned, special technique, using multi-flame welding heads. *Welds in pipe joined by the Lindeweld process are strong and ductile — stay leakproof and maintenance-free indefinitely.*



GOUGING

This relatively new Linde process rapidly cuts out a "groove" of surface metal, without harm to adjacent areas. It is used for removal of faulty or temporary welds, for correction of structural defects, for alteration of design on forgings or castings, and to provide clearance for moving parts. Applied by machine, gouging nozzles are valuable for plate-edge preparation. *This easily used process saves hours of grinding or chipping and sometimes salvages parts that otherwise would have to be scrapped.*

HARD-FACING

Parts subjected to severe abrasion, impact, or corrosion can be made to *last many times longer by applying Haynes Stellite alloys to the wearing surfaces.*

OXYGEN LANCE

To quickly sever extremely heavy sections of iron or steel—to remove gates or risers from heavy castings *—the oxygen lance is used with considerable savings in time and money.*

and **Linde** *can help you use them*

Linde can supply *all* your oxy-acetylene needs—oxygen, acetylene, carbide, apparatus, and supplies—wherever you operate. By buying from Linde, you can centralize your source of supply and thereby effect important savings.

Even more important, Linde can furnish customers practical, on-the-job help in applying the processes shown here successfully, and can help hold down process costs.

If you want to know more about these processes, or about Linde's ability to help you use them to save time and money, write us, or visit Linde's exhibit at the National Metal Exposition, Public Auditorium, Cleveland, Ohio.

THE LINDE AIR PRODUCTS COMPANY

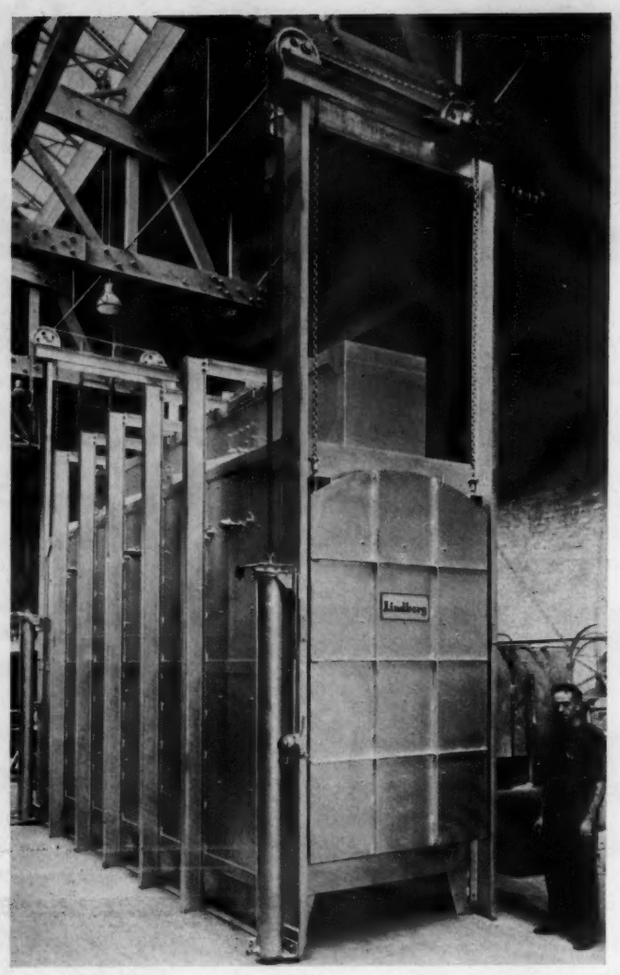
Unit of Union Carbide and Carbon Corporation

30 E. 42nd St., New York, N. Y. UCC Offices in Principal Cities

In Canada: Dominion Oxygen Company, Limited, Toronto

OXWELD, PREST-O-WELD, PUROX APPARATUS • OXWELD SUPPLIES • UNIONMELT WELDING

Frankford arsenal, Philadelphia, utilizes induction heating equipment pictured above to heat the end of a tubular shell so shell nose can be formed in nosing press seen in rear. Controls on induction furnaces automatically apply current for that period necessary to obtain heat desired



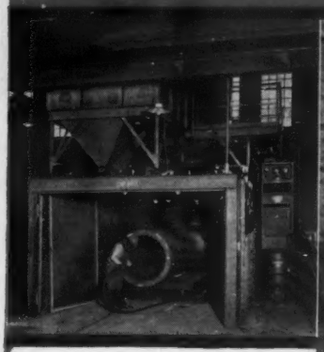
Less than a decade ago, the great air transports did not use stainless. Today it is widely employed for such parts as inner cone cowlings (shown below), fire walls, speed rings, carburetor heat shrouds, collector rings, manifolds, tail pipes and many other parts and accessories

A decided trend of the year is toward increased use of forced convection in heat treating aluminum alloys for aircraft. Most major aircraft plants now have or are planning an installation similar to the one above. Working chamber here is 42 inches wide, 16 feet long, 72 inches high

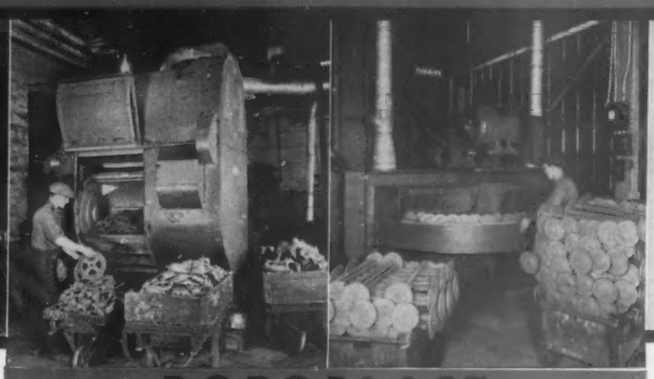
Smash the Bottlenecks!

Machines, Ordnance, Armor Plate, Shells and other Metal Parts are needed QUICKLY!

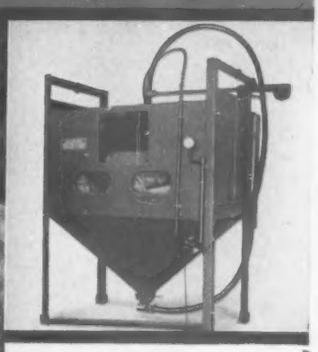
BLAST CLEANING WILL SPEED PRODUCTION



Air Blast Room, showing Operator



ROTOBLAST
BARREL TABLE



Small "EN-2" Air Blast Cabinet

Pangborn will have Air and Airless Blast Equipment at Cleveland Metal Show to demonstrate "short-cuts" in Cleaning.

Two Air Blast Cleaning Cabinets, ideal for small requirements, and the Airless Rotoblast Barrel and Table will be exhibited at the National Metal Show in October. With a Pangborn all steel frame, cloth screen Dust Collector connecting the units, the Barrel and Table will be in constant operation. Many various heat treated and other metal parts will be cleaned. Pangborn representatives will gladly explain the advantages and savings made possible by Pangborn blast cleaning and dust control equipment.

If you do not go to the show it will be worth your while to get in touch with Pangborn by letter and we'll send you detailed information on your needs without delay.

At Bottom of Steps in Lower Auditorium — Booth No. "F-22"

COME IN AND SEE EQUIPMENT IN OPERATION. ASK QUESTIONS.

PANGBORN

WORLD'S LARGEST MANUFACTURERS OF BLAST CLEANING AND DUST COLLECTING EQUIPMENT

PANGBORN CORPORATION • • HAGERSTOWN, MD.

Engineering and Metallurgy *combine* with Experience and Skill to *produce* WYCKOFF *Cold Drawn Steels*

Every WYCKOFF process is a deliberate, strictly regulated refinement of controlled-manufacture steel, to mold its character and shape to your exact requirements.

Grain size, analysis, physicals, size and section accuracy, restricted tolerances, straightness—all of these factors of steel's usefulness are every-day requirements readily met by skilled workmanship and experienced engineering at WYCKOFF. Capable metallurgy, too, keeps close watch on every bar, every grade, every operation and modern, complete furnace facilities for annealing, stress-relieving, quenching and tempering meet every demand. Combined, they produce WYCKOFF Cold Drawn Steels of unexcelled quality, uniformity and exact fitness for your job. For *your* cold finished steel requirements, it will pay you to specify WYCKOFF.

Widely distributed in America's principal industrial cities.

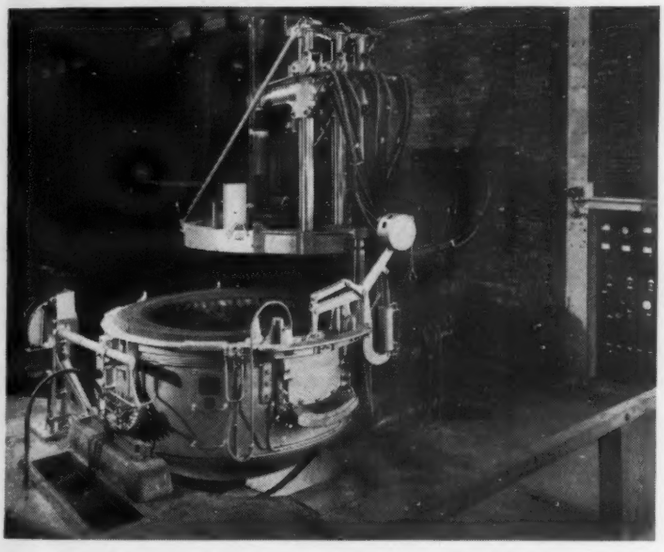
WYCKOFF

DRAWN STEEL COMPANY

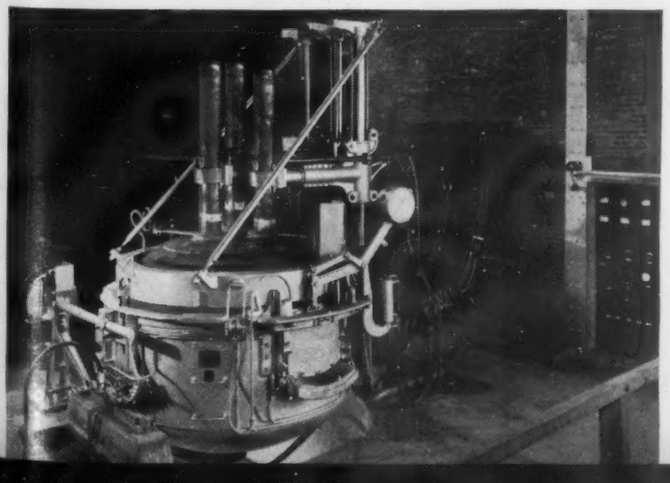
FIRST NATIONAL BANK BUILDING, PITTSBURGH, PENNA. • 3200 SO. KEDZIE AVENUE, CHICAGO, ILLINOIS

Mills at Ambridge, Pa. and Chicago, Ill. . . . Warehouse Stocks in Principal Cities . . . Manufacturers of Carbon and Alloy Steels . . . Leaded Steels . . . Turned and Polished Shafting . . . Turned and Ground Shafting . . . Wide Flats up to 12"x2"

Typical of emphasis on mechanical handling systems is this special carrier built to permit an overhead crane to lift and move 14 coils at a time to and from storage areas in a new brass mill



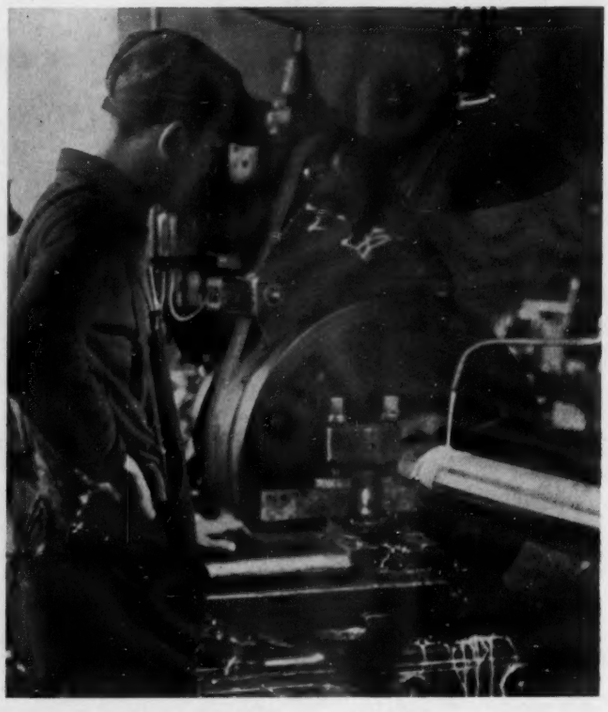
Some of the newest features in modern electric melting furnaces are shown here. Above is normal operating position and below is furnace with top raised and rotated to permit rapid charging by a drop-bottom bucket. A 6-ton heat is poured about every two hours from this steel foundry furnace



PROGRESS IN METALS *Told Pictorially*

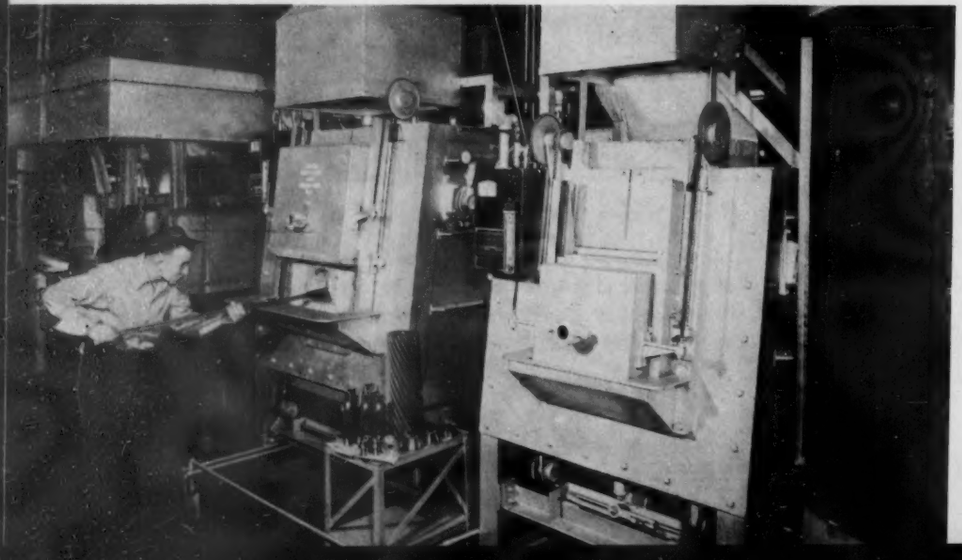
Increasing use of cemented carbide tools has emphasized importance of adequate sharpening equipment. This new machine, above, employs diamond particles bonded in metal to form the wheel. It sharpens new or old tool points with excellent speed, accuracy and economy

These new fast-operating completely automatic carburizing furnaces, above, may be important aid in manufacturing airplane and other parts in defense program because of the extremely exact tolerances they make possible. Control of carburizing gas and temperature is automatic. Here milling machine gears are being oil-quenched from a temperature of 1700 degrees Fahr.



PROGRESS IN METALS *Told Pictorially*

Advances in tooling are indicated by this operation where 1.10 per cent carbon steel tinning rolls are being machined at high speeds using new intermetallic compound, tungsten titanium carbide, at right



The pair of new furnaces for treating tool steel, at left, employ a self-generated atmosphere which protects both alloy and straight carbon steels against scale and decarburization

LATROBE

The BETTER *Tool Steel*

18-4-1

Electrite No. 1

HIGH SPEED STEEL

HIGH SPEED STEELS
for every need

ELECTRITE NO. 1
ELECTRITE NO. 19
ELECTRITE VANADIUM
ELECTRITE TATMO
ELECTRITE COBALT
ELECTRITE SUPER COBALT
ELECTRITE ULTRA COBALT

Stocked in Principal Cities

LESCO

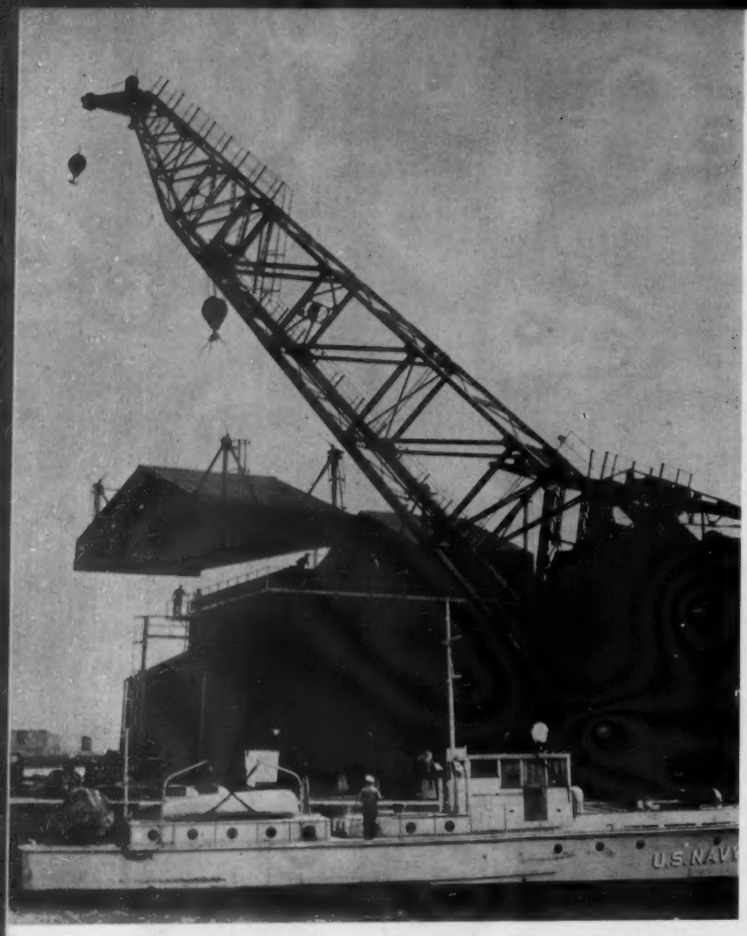
Users of high speed steels who are contributing their part to the national defense program will find ELECTRITE No. 1 fittingly adapted to this new tempo of production.

This 18-4-1 High Speed Steel possesses a maximum of red hardness and wear-resistance ideal for quality cutting tools. It responds readily to heat treatment, has a highly uniform grain structure and is of maximum density . . . factors which result in UNIFORMLY SOUND, TOUGH steel!

Ask for latest bulletin on Latrobe Electrite No. 1 high-speed steel.

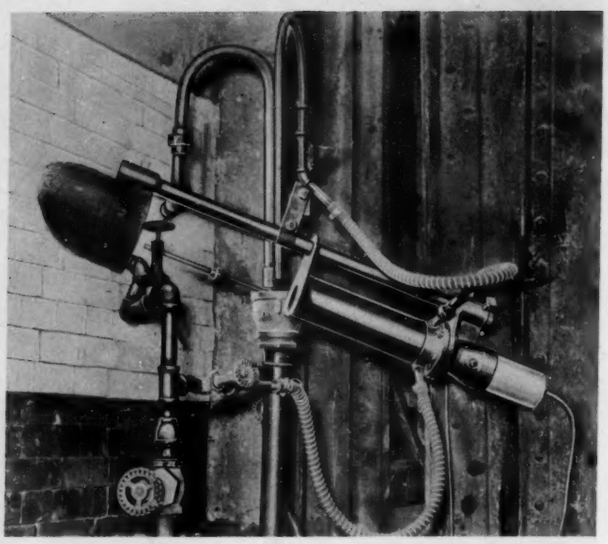
Latrobe ELECTRIC STEEL COMPANY

MAIN OFFICES *and* PLANT • • LATROBE • • PENNSYLVANIA

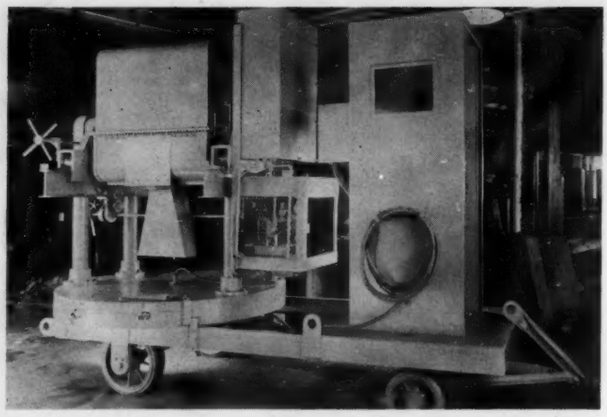


Above, pit-type recirculated-air furnace for stress relieving in one of the navy yards. Unit is so large it has to be housed in a separate building. Parts loaded into it are so immense, the only practical way of getting them into the furnace is to remove the entire roof of furnace building as a unit as shown here

New bethanizing unit for electrolytic deposition of zinc on steel wire triples output of Maryland plant producing steel wire in wide range of sizes

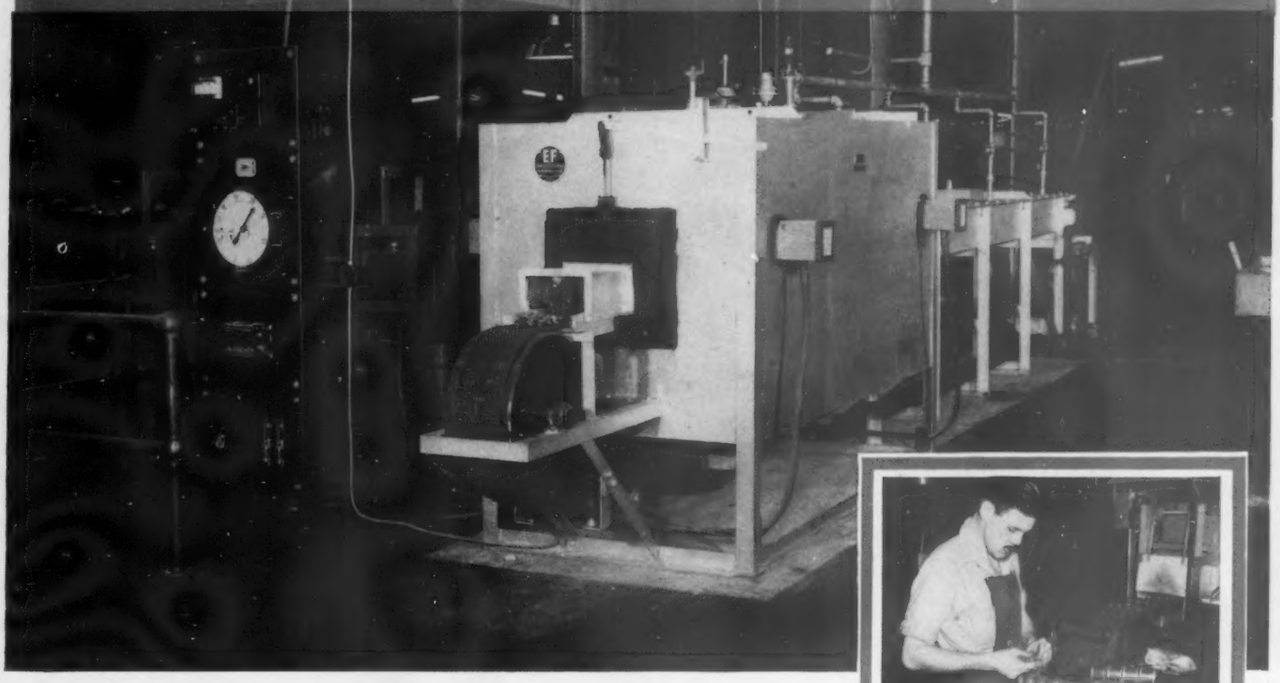


Automatic controls give greater output, more efficient furnace operation. Above a photoelectric pyrometer sights on furnace roof through backwall to indicate and record roof temperatures, assure maximum refractory life



Mobile industrial X-ray units like the one above are now available with capacity up to 400,000 volts. Extreme flexibility permits use at almost any angle or position. High voltage system is in tank over turntable. Cooling system is on back of turntable

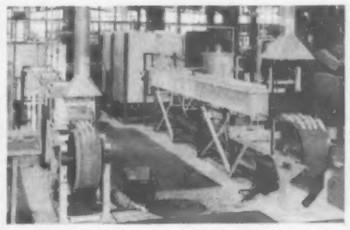
MAKING STRONGER, NEATER JOINTS 60 to 75% FASTER



with 1/4 the former Labor Cost, using Continuous Copper Brazing Furnaces

The operator assembles the parts and places them on the furnace conveyors.

The assemblies are discharged at the other end... all units securely and neatly joined.



The satisfactory results from the first furnace at left sold the larger furnace at right.

A large automobile plant installed the above E.F. furnace for joining some of their intricate assemblies. The results proved so satisfactory that within a month after the first furnace was erected they had ordered a second similar but larger unit for handling other parts. The illustration below shows both furnaces, operating side by side—copper brazing all kinds of automobile assemblies, including such parts as clutch throw-out shafts, remote control shift levers, steering knuckle support arm brackets and many other parts.

The Management reports "greatly improved results—neater, stronger joints—60 to 75% faster at about 1/4th the former labor cost."

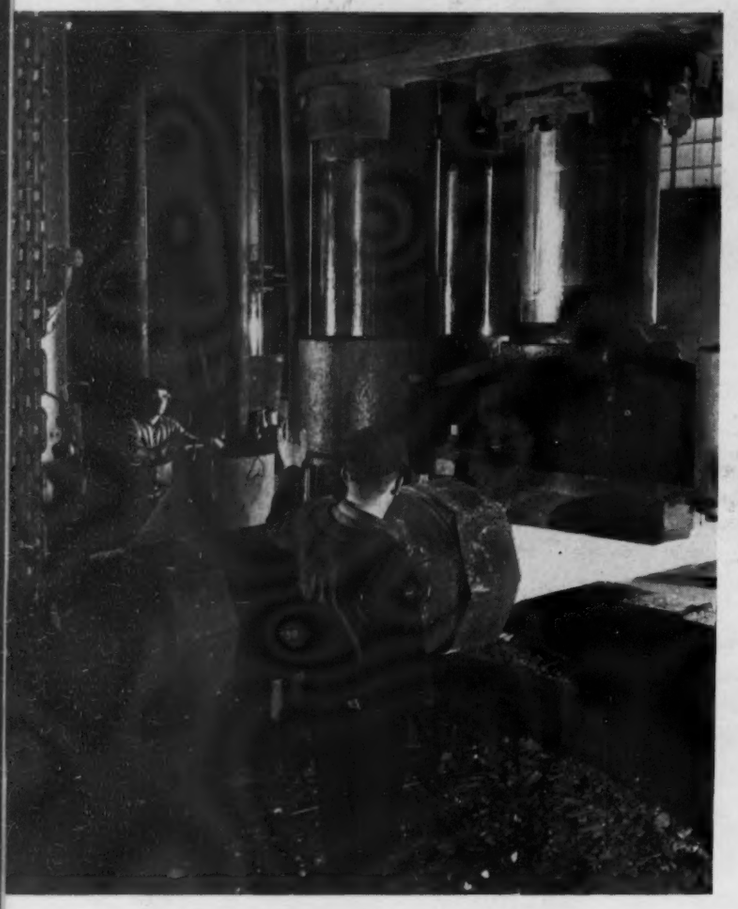
The above continuous conveyor furnace is one of the numerous types we build for the copper brazing process. Other types are handling miscellaneous other large and small assemblies ranging in size from small metal radio tube parts up to large assemblies weighing 50 lbs. or more.

Investigate the copper brazing process. We will be glad to give you complete information, put samples of your products through one of these furnaces to show you the results you can expect, give you an estimate on the cost of equipment to handle your production, together with operating costs, etc. Many prominent manufacturers are now joining their metal parts by the copper brazing process much faster, neater, cheaper and getting stronger joints than they formerly considered possible.

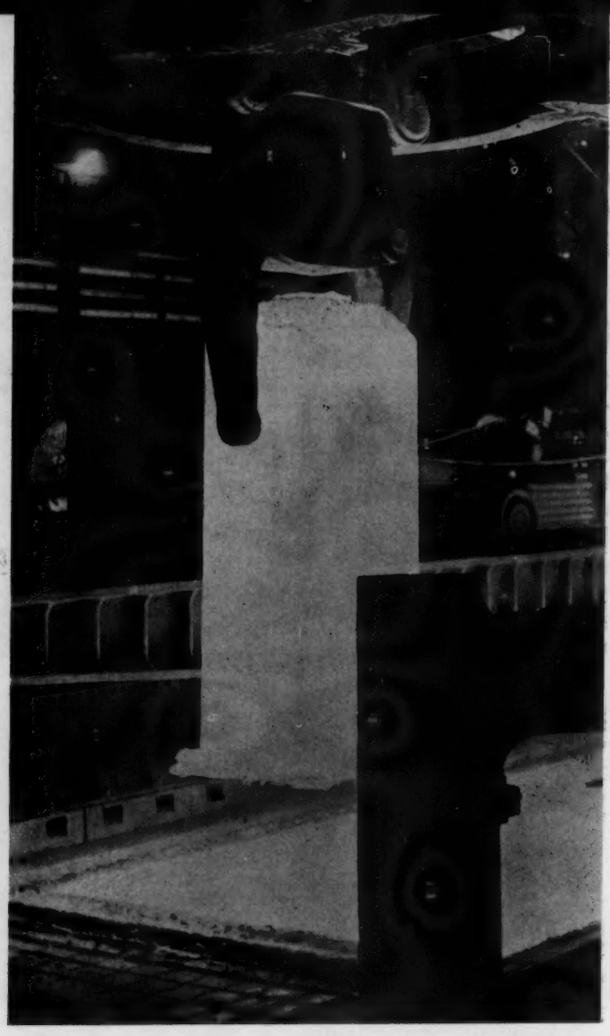
Investigate The Copper Brazing Process for Joining Your Metal Parts

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production



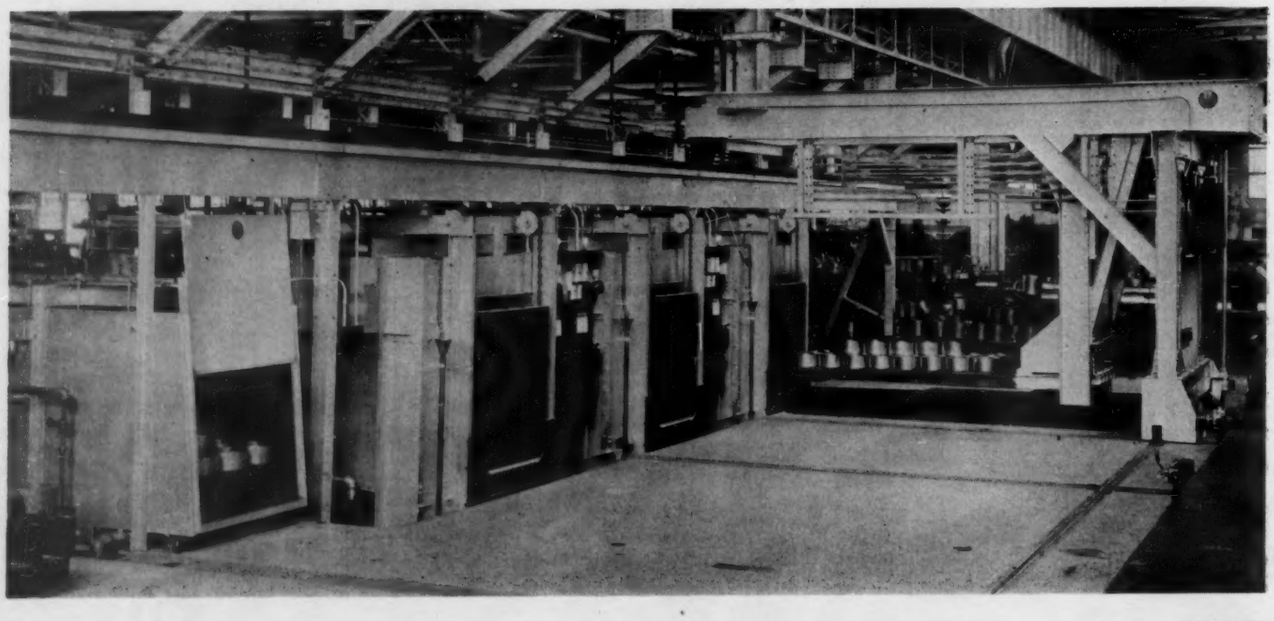
Forging presses are assuming an important part in the defense program. Above a 10,000-pound forging is being worked on a 1000-pound hydraulic forging press

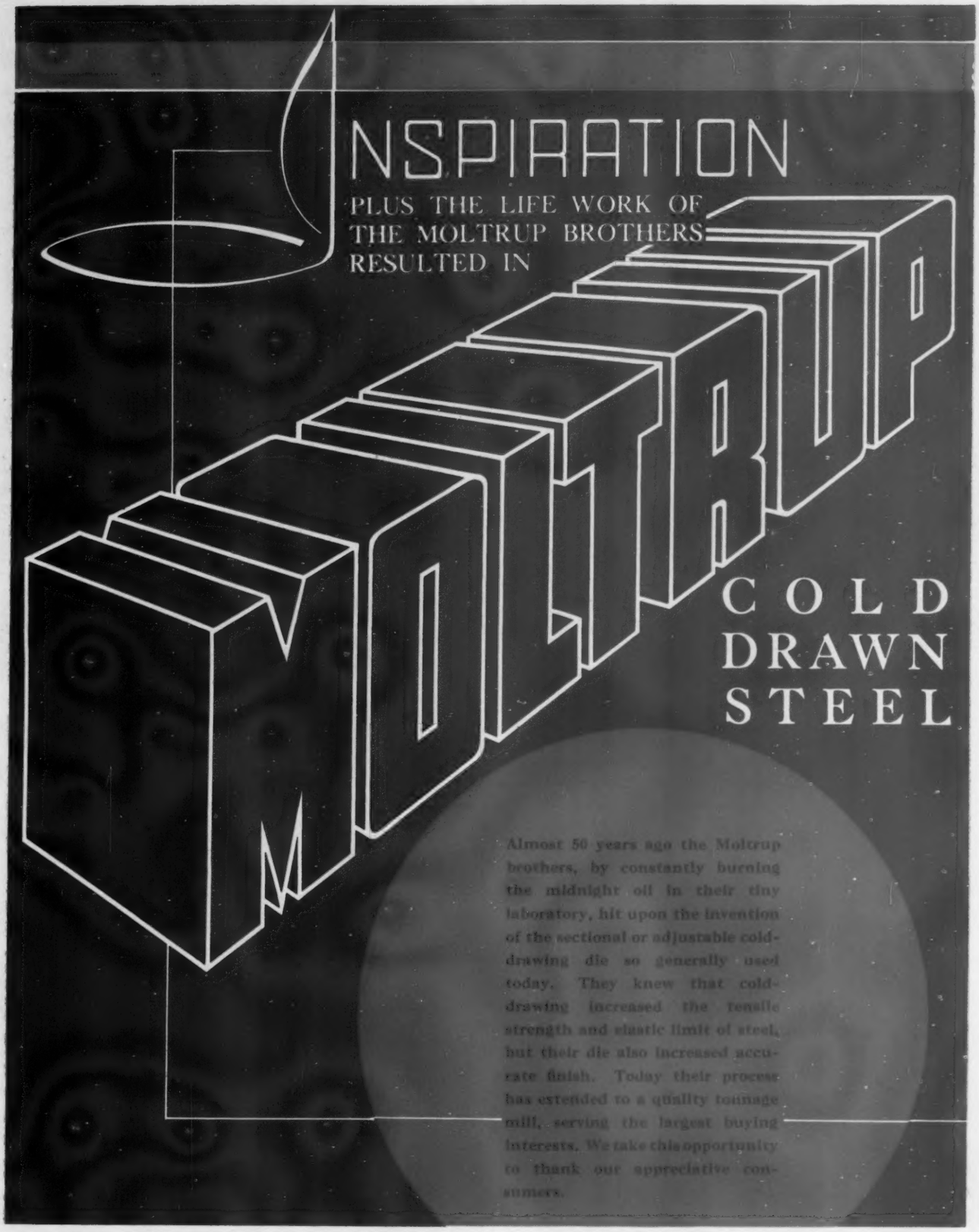


In more and more plants, manual methods of heating control are being supplanted by modern automatic systems to increase capacity and efficiency. Above is a perfectly heated ingot coming from a soaking pit in which atmosphere, temperature and pressure are automatically controlled

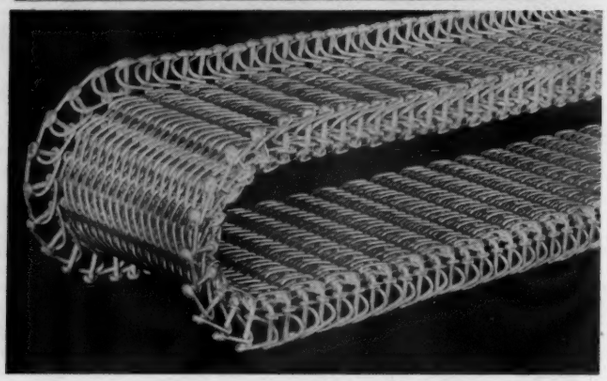
PROGRESS IN METALS *Told Pictorially*

Many tons of brass and copper alloy for shells and other rearmament work will be processed in furnaces similar to those shown below for annealing coiled copper alloy strip. There are three gas-fired single-end hearth-type heating furnaces with forced circulation; a spray cooling chamber; a water quench tank; single-leg gantry machine loader




INSPIRATION
PLUS THE LIFE WORK OF
THE MOLTRUP BROTHERS
RESULTED IN
MOLTRUP
COLD
DRAWN
STEEL
Almost 50 years ago the Moltrup brothers, by constantly burning the midnight oil in their tiny laboratory, hit upon the invention of the sectional or adjustable cold-drawing die so generally used today. They knew that cold-drawing increased the tensile strength and elastic limit of steel, but their die also increased accurate finish. Today their process has extended to a quality tonnage mill, serving the largest buying interests. We take this opportunity to thank our appreciative consumers.
MOLTRUP STEEL PRODUCTS CO.
BEAVER FALLS, PA.

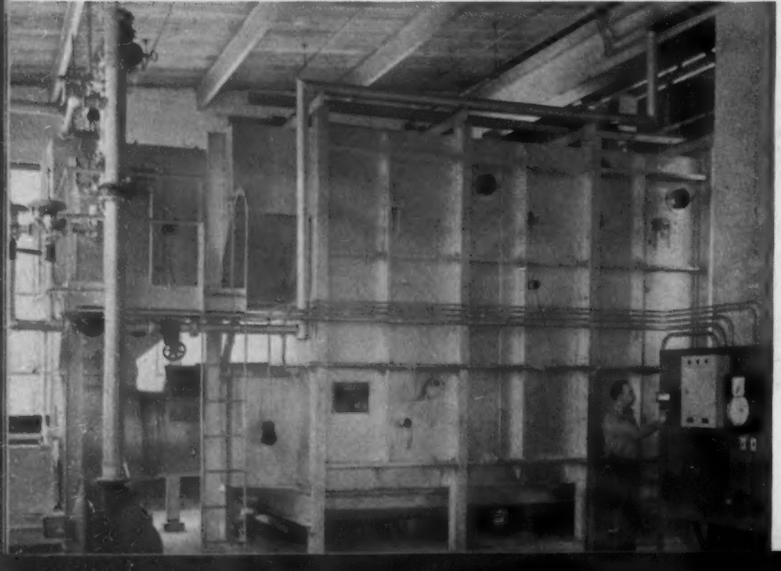
PROGRESS IN METALS
Told Pictorially



New type of woven-wire belt, above, has what is called a "telescope" edge that can be applied to any rod reinforced wire belt to provide a retaining edge as high as 25 to 30 per cent of the diameter of the smallest pulley over which the belt runs

"Stampings" made without dies—by contour sawing stacked sheets—is a recent development that makes for economical short-run work—1000 of these parts in 4 hours. Similar uses of modern contour sawing at 10 to 20 times faster than older machining methods make possible "forgings" without dies, precision one-direction filing, etc.

Only 9 inches long, electric nibbler, right, is being widely used for aircraft and similar work where fast cutting of odd shapes and only a few pieces are involved. It cuts its own clearance so can cut wide sheet without distortion. Handling up to 18-gage steel, 15-gage aluminum, unit will cut on 1-inch radius, cut shapes from $1\frac{1}{2}$-inch diameter tubes



Left, latest type recirculating air carbottom furnace used to stress relieve welded gun carriages at 1000 degrees Fahr. Carbottom furnace handles large bulky work easily. Circulated air assures uniform heating

Geared for EMERGENCY PRODUCTION
B L
B & L FREE-MACHINING STEELS
STEEL moves into first place as an essential industry . . . its products vital to national defense, as well as to peace-time prosperity • That the efforts of a united nation may not be "too little nor too late," American manufacturers are marshaling their resources for "total production" • B & L Free-Machining Steels are a prime aid in this rapid expansion of output • They are specially developed for increasing machine efficiency without sacrifice of quality or safety • Their uniformity assures better products, longer runs and lower costs in fabricating machine parts • B & L Cold Finished Bar Steels are available in a full range of grades . . . Bessemer and Open Hearth, leaded and non-leaded, for all demands of modern service
COLD DRAWN BARS • GROUND SHAFTING • SCREW STOCK • LEADED STEELS • ALLOY STEELS
BLISS & LAUGHLIN, INC.
HARVEY, ILL. Sales Offices in All Principal Cities BUFFALO, N. Y.

FCC ★ PRODUCTS ★ ★

Remarkable Resistance to Abrasion

CAMS OF ALL TYPES Cast from FCC Air Hardening Tool Steel

Send for FCC Products Catalog and Composite Steel Die Section Engineering Data Folder.

QUALITY FCC SERVICE

THE FORGING and CASTING CORPORATION

FERNDALE (DETROIT) MICHIGAN

TECHNICAL PROGRAM

Monday, Oct. 21

9:30 A. M. HOTEL STATLER

"Correlation of High Temperature Creep and Rupture Test Results," by R. H. Thielemann, General Electric Co., Schenectady, N. Y.

"The Development of Alloys For Use At Temperatures Above 1000 Degrees Fahr.", by E. R. Parker, General Electric Co., Schenectady, N. Y.

"The Significance of Hydrogen in the Metallurgy of Malleable Cast Iron," by H. A. Schwartz, G. M. Guiler and M. K. Barnett, National Malleable & Steel Castings Co., Cleveland.

"Factors Affecting the Activity of Carburizing Compounds," by M. Sutton, Standard Oil Co. of Indiana, Whiting, Ind., and R. A. Ragatz, University of Wisconsin, Madison, Wis.

1:30 P. M. PUBLIC AUDITORIUM

"A Balanced Protective Atmosphere—Its Production and Control," by J. R. Gier, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Furnace Atmosphere Generation," by Sam Tour, Lucius Pitkin, Inc., New York.

"Dimensional Changes on Hardening High Chromium Tool Steels," by H. Scott and T. H. Gray, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

"Water Vapor in Furnace Atmosphere," by Sam Tour.

5:00 P. M. PUBLIC AUDITORIUM

Educational Lecture

"The Strength of Metals Under Combined Stresses," by Maxwell Gensamer, Carnegie Institute of Technology, Pittsburgh. (*Continued each successive day at this time until Friday, when it is concluded at* 9:00 *A. M.*)

8:30 P. M. PUBLIC AUDITORIUM

Educational Lecture

"Principles of Quenching," by A. A. Bates, Westinghouse Electric & Mfg. Co., East Pittsburgh. (*Continued each successive day but under title and speaker noted in program.*)

Tuesday, Oct. 22

9:30 A. M. HOTEL STATLER

"Transformation of Austenite on Continuous Cooling and Its Relation to Transformation at Constant Temperatures," by R. A. Grange, United States Steel Corp., Kearny, N. J., and J. M. Kiefer, United States Steel Corp., Cleveland.

"Influence of Austenitic Grain Size on the Critical Cooling Rate of High-Purity Iron-Carbon Alloys," by T. G. Digges, National Bureau of Standards, Washington, D. C.

"Dilatometric Studies in the Transformation of Austenite in a Molybdenum Cast Iron," by D. B. Oakley and J. F. Oesterle, University of Wisconsin, Madison, Wis.

"Effect of Rate of Heating Through the Transformation Range on Austenitic Grain Size," by S. J. Rosenberg and T. G. Digges, National Bureau of Standards, Washington, D. C.

9:30 A. M. HOTEL STATLER

"Recovery of Nickel From Cold Working on Annealing," by Erich Fetz, Wilbur B. Driver Co., Newark, N. J.

"Structural Changes in Low Carbon Steels Produced by Hot and Cold Rolling," by N. P. Goss, Cold Metal Process Co., Youngstown, O.

"Quantitative Measurement of Strain Hardness in Austenitic Manganese Steel," by D. Niconoff, Republic Steel Corp., Canton, O.

"Equilibrium Relations in the Solid State of the Iron-Cobalt System," by W. C. Ellis and E. S. Greiner, Bell Telephone Laboratories, New York.

1:30 P. M. PUBLIC AUDITORIUM

"The Effect of Molybdenum and Columbium on the Structure, Physical Properties and Corrosion Resistance of Austenitic Stainless Steels," by R. Franks, W. O. Binder and C. R. Bishop, Union Carbide & Carbon Research Laboratories, Niagara Falls, N. Y.

"Kinetics and Reaction Products of the Isothermal Transformation of a 6 Per Cent Tungsten, 6 Per Cent Molybdenum High Speed Steel," by J. L. Ham, R. M. Parke and A. J. Herzig, Climax Molybdenum Co., Detroit.

"Some Surface Studies on Treated High Speed Steel," by J. G. Morrison, Landis Machine Co., Waynesboro, Pa.

"Surface Carbon Chemistry and Grain Size of 18-4-1 High Speed Steel," by W. A. Schlegel, The Carpenter Steel Co., Reading, Pa.

5:00 P. M.

Educational Lecture (*See Monday*)

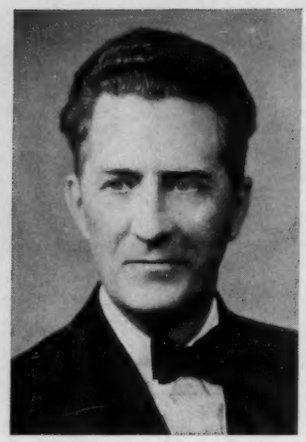
8:30 P. M.

Educational Lecture

"Quenching in Production Heat Treating," by W. J. Conley, University of Rochester, Rochester, N. Y.

James P. Gill
President, American Society for Metals; Chief Metallurgist, Vanadium-Alloys Steel Co., Latrobe, Pa.

Oscar E. Harder
Vice President, American Society for Metals; Assistant Director, Battelle Memorial Institute, Columbus, O.



Samuel L. Hoyt
Campbell Memorial Lecturer; Technical Advisor, Battelle Memorial Institute, Columbus, O.

William H. Eisenman
Secretary, American Society for Metals; General Manager, National Metal Exposition

Wednesday, Oct. 23

9:30 A. M. HOTEL STATLER

1940 Edward De Mille Campbell Memorial Lecture, by S. L. Hoyt, Battelle Memorial Institute, Columbus, O.

1:30 P. M. PUBLIC AUDITORIUM

"The Technique of Microradiography and Its Application to Metals," by G. L. Clark, University of Illinois, Urbana, Ill. and W. M. Shafer, Iowa State Teachers College, Cedar Falls, Iowa.

"Quantitative Evaluation of Distortion in Silicon Steel and in Aluminum," by G. L. Clark and W. M. Shafer.

"Notes on the Interpretation of X-Ray Diffraction Diagrams and Evidence of Mosaic Structures," by N. P. Goss, Cold Metal Process Co., Youngstown, O.

"Effects Upon Furnace Refractories of Protective Gases for High Carbon Steels," by J. H. Loux, Salem Engineering Co., Salem, O.

1:30 P. M. PUBLIC AUDITORIUM

"Further Notes on Precipitation Hardening in the Heavy Alloys," by W. P. Sykes, General Electric Co., Cleveland.

"Some Properties of Hot Pressed and Sintered Copper Powder Compacts," by C. G. Goetzel, American Electro Metal Corp., Yonkers, N. Y.

"The Precipitation Reaction in Cold Rolled Phosphor Bronze: Its Effects on Hardness, Conductivity and Tensile Properties," by R. H. Harrington and R. G. Thompson, General Electric Co., Schenectady, N. Y.

"The Effect of Impurities on Some High Temperature Properties of Copper," by E. R. Parker, General Electric Co., Schenectady, N. Y.

5:00 P. M. PUBLIC AUDITORIUM

Educational Lecture (*See Monday*)

8:30 P. M. PUBLIC AUDITORIUM

Educational Lecture

"Quenching in Custom Heat Treating," by R. G. Roshong, Lindberg Steel Treating Co., Chicago.

Thursday, Oct. 24

9:30 A. M. HOTEL STATLER

"Cementite Stability and Its Relation to Grain Size, Abnormality and Hardenability," by C. R. Austin and M. C. Fetzer, Pennsylvania State College, State College, Pa.

"Effect of Deoxidation on Hardenability," by C. V. Cash, General Electric Thomson Research, West Lynn, Mass., T. W. Merrill, U. S. Steel Laboratories, Kearny, N. J., and R. L. Stephenson, Carnegie-Illinois Steel Corp., Duquesne, Pa.

"The Effect of Grain Size on Hardenability," by M. A. Grossman, Carnegie-Illinois Steel Corp., So. Chicago, Ill. and R. L. Stephenson.

"Hardening Characteristics of Various Shapes," by M. Asimow, Carnegie-Illinois Steel Corp., Gary, Ind., and M. A. Grossman, Carnegie-Illinois Steel Corp., So. Chicago, Ill.

9:30 A. M. HOTEL STATLER

"Effect of Nitrogen on the Case Hardness of Two Alloy Steels," by S. W. Poole, Republic Steel Corp., Canton, O.

"Influence of Silicon and Aluminum Additions on the Constitutional Diagram of 4-6 Cr-Mo Steel," by C. L. Clark, Timken Roller Bearing Co., Canton, O. and M. A. Bredig, Vanadium Corp. of America, New York.

"The Effect of Molybdenum on the Isothermal Transformation of Austenite in Low and Medium Carbon Steels," by J. R. Blanchard, R. M. Parke and A. J. Herzig, Climax Molybdenum Co., Detroit.

"Effects of Small Amounts of Alloying Elements on the Tempering of Pure Hypereutectoid Steels," by C. R. Austin and B. S. Norris, Pennsylvania State College, State College, Pa.

1:30 P. M. PUBLIC AUDITORIUM

"Anodic Treatment of Aluminum," by J. D. Edwards, Aluminum Co. of America, New Kensington, Pa.

"Passivation and Coloring of Stainless Steel," by G. C. Kiefer, Allegheny-Ludlum Steel Corp., Brackenridge, Pa.

"Chemical Treatment of Magnesium Alloys," by H. W. Schmidt, Dow Chemical Co., Midland, Mich.

"Corrosion Resistance of Tin Plate; Influence of Steel Case Composition on Service Life of Tin Plate Containers," by R. Hartwell, American Can Co., Maywood, Ill.

"Zinc Coatings: Unit Operations, Costs and Properties," by J. L. Bray, Purdue University, Lafayette, Ind., and F. R. Morral, Continental Steel Corp., Kokomo, Ind.

1:30 P. M. PUBLIC AUDITORIUM

"The Fatigue and Bending Properties of Cold Drawn

(*Please turn to Page* 234)

Compare all 10 Values WHEN BUYING BLAST CLEANING EQUIPMENT ... AND YOU'LL Specify the AIRLESS WHEELABRATOR

GET ALL THE FACTS about metal cleaning equipment before you buy—and don't fail to investigate the airless WHEELABRATOR. For here is the fastest selling blast cleaning equipment on the market. It is the answer to some of your most trying problems: faster cleaning and better finishes at lowest cost. Let us arrange for a demonstration on some of your own products. You can then see for yourself how remarkable this modern cleaning process really is.

1 Compare — PERFORMANCE

Unless you have seen the WHEELABRATOR in operation, or examined the beautiful cleaning job it does, or investigated its amazing cleaning speed, you have an agreeable surprise in store for you. See one demonstrated—there are several near you.

2 Compare — SAVINGS

Sharpen your pencil and get set for some real cost-cutting figures when you study WHEELABRATING. You'll find savings everywhere you turn—enough to return the investment in 6 to 18 months if you have a reasonably normal production.

3 Compare — VERSATILITY

The range of products being cleaned by WHEELABRATING runs from small washers and springs to bathtubs and armor plate;—the problems solved cover the removal of burrs from machined parts to the finishing of metals for enameling.

4 Compare — ADVANTAGES IN MACHINING

WHEELABRATED products, being perfectly sand and scale-free, are easier to grind and machine. Tools last longer and need fewer grindings. Inspection is easier and more accurate because surface defects are "washed-out".

5 Compare — CONSTRUCTION FEATURES

From the exclusive endless conveyor method of tumbling used in the Tumblast to the monorail conveyor system used in Special Cabinets, WHEELABRATOR equipment is replete with modern, well-engineered features.

6 Compare — ENGINEERING DESIGN

American's background of 32 years' experience, plus an enviable record of achievement in pioneering advanced industrial equipment is your assurance of a product embodying the most modern engineering design.

7 Compare — CLEANLINESS OF OPERATION

When the WHEELABRATOR is served by recommended exhaust equipment, operation is virtually dust-tight. The equipment has been recommended by all health and insurance authorities who have investigated installations engineered by us.

8 Compare — RANGE OF SIZES AND TYPES

WHEELABRATOR is built in standard and special sizes and types for all metal cleaning requirements. Whether your plant is large or small come to *American*—you'll find the WHEELABRATOR line the most complete in the industry.

9 Compare — NUMBER OF USERS

WHEELABRATOR is manufactured by the world's largest manufacturer of airless blast cleaning equipment. Nearly 1,000 of these machines have been installed since 1933 (an all-time record in the blast cleaning equipment field).

10 Compare — CUSTOMER SATISFACTION

By all means talk to WHEELABRATOR users. Ask for their frank opinions. The more users you contact, the more convinced you'll be that WHEELABRATOR is *"the better buy"*—especially when you compare side-by-side operation.

SEE OUR EXHIBIT AT THE NATIONAL METALS SHOW—OCT. 21-25

WORLD'S LARGEST BUILDERS OF AIRLESS ABRASIVE BLASTING EQUIPMENT

American FOUNDRY EQUIPMENT CO.

509 S. BYRKIT ST. MISHAWAKA, IND.

OFFICES IN PRINCIPAL CITIES CABLE ADDRESS: AFECO

TECHNICAL PROGRAM

Headquarters, Cleveland Hotel

Monday, Oct. 21

9:30 A. M.—Red Room, Mezzanine

Presentation of Medals and Prizes

10:30 A. M.

Shipbuilding and Structural

"Welding in Shipbuilding," by David Arnott, American Bureau of Shipping, New York.

"Welded Rigid Frame Structures," by A. Amirikian, Navy department, Washington.

12:00 Noon

Opening Metals Exposition

2:00 P. M.—Ball Room, Mezzanine

Steel Mill

"Resistance Flash Welding of Strip in Steel Mills," by J. H. Cooper, Taylor-Winfield Corp., Warren, O.

"Design and Fabrication of Heavy Rolling Mill Machinery," by G. W. Linkhauer, United Engineering & Foundry Co., Pittsburgh.

"Shape Cutting in Steel Mill," by Joseph Stanley, Carnegie-Illinois Steel Corp., Pittsburgh.

"Hard Facing Steel Equipment," by Frank L. Gray, Carnegie-Illinois Steel Corp., Pittsburgh.

2:00 P. M.—Red Room, Mezzanine

Industrial Research

"Testing for Weldability of Carbon Steels," by C. E. Jackson and G. G. Luther, Naval Research Laboratory, Anacostia Station, Washington.

"Defects in Weld Metal and Hydrogen in Steel," by Carl A. Zapffe and C. E. Sims, Battelle Memorial Institute, Columbus, O.

"Improving Ductility of Oxyacetylene Welds by Aging," by J. R. Dawson and A. R. Lytle, Union Carbide & Carbon Laboratories, Niagara Falls, N. Y.

"Metallurgical Changes at Welded Joints and the Weldability of Steels," by R. H. Aborn, United States Steel Corp. Research Laboratory, Kearny, N. J.

7:30 P. M.

Industrial Research Conference

Tuesday, Oct. 22

9:30 A. M.—Ball Room, Mezzanine

Machinery

"Operation Problems in the Small Welding Shop," by Roger B. White and J. T. Lewis Jr., Lewis Welding & Engineering Corp., Cleveland.

"Welding Electrical Machinery," by R. A. Taylor, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

George T. Horton

"Flame Machining—Control and Applications," by G. L. Walker and W. G. Sylvester, Air Reduction Sales Co., Jersey City, N. J.

9:30 A. M.—Red Room, Mezzanine

Fundamental Research

"A Method of Studying the Effects of Inertia and Friction in Resistance Welding Machines," by W. F. Hess and R. A. Wyant, Rensselaer Polytechnic Institute, Troy, N. Y.

"The Welding of Carbon-Molybdenum Piping for High Temperature, High Pressure Service," by R. W. Emerson, Pittsburgh Piping & Equipment Co., Pittsburgh.

"Micro-Fissuring in Multiple Bead, Low Carbon Steel Welds," by J. L. Miller and L. R. Kovac, Armour Institute of Technology, Chicago.

2:00 P. M.—Ball Room, Mezzanine

Machinery

"Flame Hardening," by R. H. Zeilman, Thew Shovel Co., Lorain, O.

"Production Flame Hardening of Machine Parts," by John Erler and P. H. Tomlinson, Farrel-Birmingham Co. Inc., Ansonia, Conn.

"High-Speed Mechanized Oxyacetylene Welding," by H. T. Herbst, The Linde Air Products Co., New York.

"Machine Flame Cutting in Preparation for Welding," by W. Roy Widdoes, By-Products Steel Corp., Coatesville, Pa.

"Use of Welding and Cutting in the Fabrication of Ditching Equipment," by A. R. Askue, Cleveland Trencher Co., Cleveland.

2:00 P. M.—Red Room, Mezzanine

Fundamental Research

"Welded Girders with Inclined Stiffeners," by Cyril Jensen and C. Antoni, Lehigh University, Bethlehem, Pa.

"Measurement of Contact Resistance," by W. B. Kouwenhoven and Joseph Tampico, Johns Hopkins University, Baltimore.

"Electrodes for Welding Cast Iron," by Gilbert S. Schaller, University of Washington, Seattle.

"Fundamentals of Resistance Welding," by R. S. Pelton, General Electric Co., Schenectady, N. Y.

7:30 P. M.

Fundamental Research Conference

Wednesday, Oct. 23

9:30 A. M.—Rose Room, Mezzanine

Resistance Welding

"Resistance Welding Electrodes—Some Fundamental Considerations," by G. N. Sieger, S-M-S Corp., Detroit.

"Changes in the Shape of Spherical Spot-Welding Electrodes," by W. F. Hess and R. A. Wyant, Rensselaer Polytechnic Institute, Troy, N. Y.

"Recorders and Indicators for Resistance Welding Machines," by W. C. Hutchins, General Electric Co., Schenectady, N. Y.

9:30 A. M.—Red Room, Mezzanine

Fundamental Research

"The Effect of the Physical State of Steel Upon the Tensile Strength

(*Please turn to Page* 232)

SPOT WELDS WITHOUT EQUAL..!

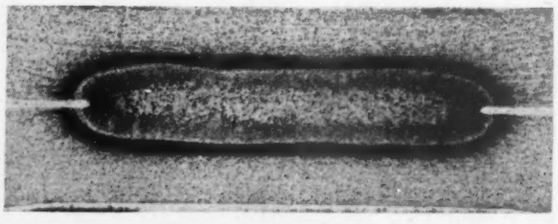
Taylor-Winfield again presents industry with another and greatly perfected spot-welder—an exclusive product of its research laboratory, designed and built under *one* responsibility.

It's the NEW HI-WAVE Welder combining these salient features:

- **Three phase operation at high power factor**
- **Low power demand eliminating expensive installation**
- **Simplified controls readily accessible**
- **Weld structure entirely free from cracks or other faults**
- **Uniform results**
- **High production speed**
- **Long electrode life**

That you may personally inspect the quality of the welds produced by this HI-WAVE Welder, a unit will be in operation at the Metal Show—Booth B-36.

Other demonstrating units are in operation at 2020 Santa Fe Avenue, Los Angeles and at the factory, Warren, Ohio. Complete details in Bulletin No. 1405.



Photomacrograph of HI-WAVE Weld in two pieces of .064" thick 24 ST Alclad. Magnification 10 diameters.

HI-WAVE

WELDERS

The TAYLOR WINFIELD Corporation

WARREN, OHIO, U.S.A.

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ELECTRIC, BUTT
SPOT AND SEAM
WELDERS

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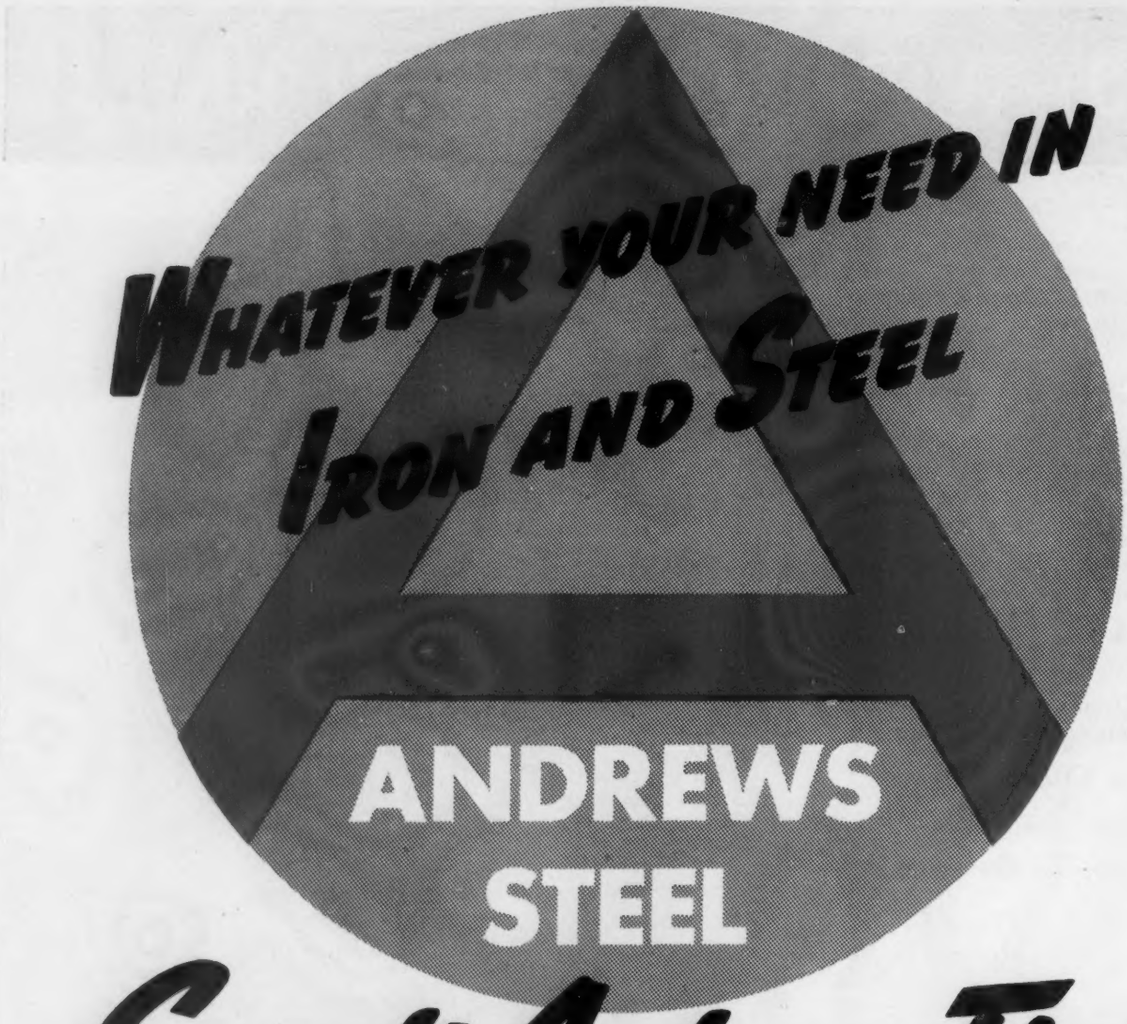
The Denton & Anderson Company—Cleveland, Chicago, Detroit. Other Representatives in principal cities of the U. S.



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Made to meet your individual requirements, Andrews offers special formulae Bars, Plates, Universal Mill Plates, Sheet Bars, Billets, Blooms, and Slabs in carbon and alloy steel of guaranteed, unvarying quality . . . manufactured to the highest metallurgical standards under rigid, scientific control.

Whatever your use of iron and steel it will be to your profitable advantage to consult Andrews first.

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DIVISIONS
THE NEWPORT ROLLING MILL COMPANY
THE GLOBE IRON ROOFING & CORRUGATING CO.

TECHNICAL PROGRAM

Monday, Oct. 21

9:00 A. M.—Hotel Cleveland

Registration, Conference Suite Lounge (Parlor Floor)

10:00 A. M.—Empire Room, Parlor Floor

Joint Session

Constitution of Alloys

"An Investigation on the Structure and Properties of Some Iron-Nickel Alloys," by George Sachs, assistant professor, department of metallurgy, and J. Spretnak, Case School of Applied Science, Cleveland.

"Precision X-ray Study of the High Silver Aluminum-Silver Alloys," by Frank Foote, instructor in metallurgy, Cooper Union, and Eric R. Jette, professor of metallurgy, School of Mines, Columbia university, New York.

"X-ray Analysis of Hot-Galvanized Heat-Treated Coatings," by F. R. Morral, research metallurgist, Continental Steel Corp., and E. P. Miller, physics department, Purdue university, Lafayette, Ind.

12:15 P. M.—Private Dining Room, Mezzanine Floor

Institute of Metals Division, Executive Committee Luncheon Meeting.

Committee on Blast Furnace and Raw Materials Luncheon Meeting.

2:00 P. M.—Empire Room, Parlor Floor

Iron and Steel Division

Bessemer Steel

"The Acid Bessemer Process of 1940," by H. W. Graham, director of metallurgy and research, Jones & Laughlin Steel Corp., Pittsburgh.

Edmund M. Wise

"Method of Dephosphorization of Bessemer Steel," by Gordon M. Yocom, superintendent, Steel Works & Rolling Mills, Wheeling Steel Corp., Wheeling, W. Va.

2:00 P. M.—Rooms 34 and 36 Parlor Floor

Institute of Metals Division

Lead and Zinc

"Creep and Recrystallization of Lead," by Albert A. Smith Jr., research metallurgist, American Smelting & Refining Co., Barber, N. J.

"The Grain Orientation of Cast Polycrystalline Zinc, Cadmium and Magnesium," by Gerald Edmunds, investigator, research division, The New Jersey Zinc Co., Palmerton, Pa.

Tuesday, Oct. 22

10:00 A. M.—Rooms 34 and 36, Parlor Floor

Institute of Metals Division

Copper

"Coalesced Copper; Its History, Production and Characteristics," by H. H. Stout, consulting metallurgical engineer.

"The Hydrogen Embrittlement of Pure Copper," by Frederick N. Rhines, assistant professor metallurgy, and William A. Anderson, research assistant, metals research laboratory, Carnegie Institute of Technology, Pittsburgh.

10:00 A. M.—Empire Room, Parlor Floor

Iron and Steel Division

Surface Qualities

"Surface Finish and Structure," by John Wulff, associate professor of physical metallurgy, Massachusetts Institute of Technology, Cambridge, Mass.

"Analysis of the Cold-rolling Texture of Iron," by Charles S. Barrett, member of staff, and L. H. Levenson, research assistant, metals research laboratory, Carnegie Institute of Technology, Pittsburgh.

12:15 P. M.—Private Dining Room, Mezzanine Floor

Iron and Steel Division, Executive Committee Luncheon Meeting.

2:00 P. M.—Empire Room, Parlor Floor

Joint Session

Physical Metallurgy

"Measurement of Irreversible Potentials as a Metallurgical Research Tool," by R. H. Brown, William L. Fink, research metallurgist, and M. S. Hunter, aluminum research laboratories, Alu-

(*Please turn to Page* 234)

Frank T. Cisco

TECHNICAL PROGRAM

Headquarters—Carter Hotel

Monday, Oct. 21

10:30 A. M.
Directors' Meeting

12 Noon
Program Committee Lunch

2:30 P. M.

"Tungsten Carbide Dies and Tools," by James R. Longwell, chief engineer, Carboloy Co. Inc., Detroit.

"Recent Developments in Heating Copper Wire Bars," by Joseph A. Doyle, vice president, W. S. Rockwell Co., New York.

"Electric Direct Resistance Wire Treating," by J. P. Zur, engineer, Trauwood Engineering Co., Cleveland.

Tuesday, Oct. 22

9:30 A. M.

"Lime For the Wire Industry," by D. E. Washburn, chief chemist, American Lime & Stone division, The Warner Co., Bellefonte, Pa.

"Electro Chemical Applications in the Wire Industry," by Dr. C. L. Mantell, consulting engineer, New York.

"Application of Tungsten Carbide Tools and Dies," a lecture with motion pictures, Firth Sterling Steel Co., McKeesport, Pa.

1:30 P. M.

"The Endurance Properties of Hard Drawn Wire from Various Kinds of Copper," by John N. Kenyon, instructor, Civil Engineering department, Columbia University, New York.

"Reactive Wire Drawing," by H. A. Stringfellow, Worcester, Mass.

"Copper From Mine to Market," a lecture with motion pictures, Narrator, H. A. Stout, Phelps Dodge Copper Products Co., New York.

Wednesday, Oct. 23

9:30 A. M.

"What Does Good Laboratory Practice Do to Help Production in the Steel Plant," by Geo. P. Lenz Jr., metallurgist, Union Drawn Steel division, Republic Steel Corp., Massillon, O.

"Galvanizing Characteristics of Different Types of Steels," by Robert W. Sandelin, metallurgist, Atlantic Steel Co., Atlanta, Ga.

1:00 P. M.

Wire Association Luncheon

"Steel Quality and Labor Relationship," C. M. White, vice president of operations, Republic Steel Corp., Cleveland.

3:00 P. M.

Mordica Memorial Lecture

"The Use of Plane Polarized Light and Sensitive Tint Illumination in the Analysis of the Microstructure of Steel," by B. L. McCarthy, chief metallurgist, Wickwire Spencer Steel Co., Buffalo.

J. K. Beeson

7:30 P. M.—Carter Hotel
Annual Dinner

Thursday, Oct. 24

9:45 A. M..

"Design and Operation of a New Copper Wire Drawing Plant," by H. Blount, manufacturing engineer, Point Breeze Works, and J. E. Wiltrakis, engineer, Kearny Works, Western Electric Co.

"Development of Apparatus for Shaving Copper Wire Commercially," by C. E. Weaver, development engineer, works laboratory, General Electric Co., Schenectady.

1:30 P. M.
Plant Inspection of Trauwood Engineering Co.

7:00 P. M.—Hotel Statler
American Society for Metals Dinner

A.W.S. Program

(*Continued from Page* 228)

of Brazed Joints," by F. C. Kelley, General Electric Co., Schenectady, N. Y.

"Crater Formation and the Force of the Electric Welding Arc in Various Atmospheres," by G. E. Doan, Lehigh University, Bethlehem, Pa., and R. E. Lorentz, Combustion Engineering Co., New York.

"Cold Rolling Testing of Welds," by T. P. Hughes and R. L. Dowdell, University of Minnesota, Minneapolis.

2:00 P. M.—Ball Room, Mezzanine
Resistance Welding

"Scope and Limitations of the Stored Energy Type Resistance Welding," by C. Weygandt, Moore School of Engineering, University of Pennsylvania, West Philadelphia, Pa., and G. S. Mikhalapov, Baldwin Southwark Div., The Baldwin Locomotive Works, Philadelphia.

"A Study of Spot Welding on a Copper Base Alloy," by M. L. Wood, J. Babin and O. B. Atkin, Chase Brass & Copper Co., Waterbury, Conn.

"Stored Energy Systems of Spot Welding," by H. B. Axtell and R. L. Ringer Jr., Taylor-Winfield Corp., Warren, O.

"Electro-Brazing Methods," by R. J. Wensley, I-T-E Circuit Breaker Co., Philadelphia.

"Spot Welding in Aircraft Construction," by C. F. Marschner, McDonnell Aircraft Corp., St. Louis.

2:00 P. M.—Red Room, Mezzanine
Structural

"Shall We Weld Our Bridges," by Fred L. Plummer, Hammond Iron Works, Warren, O.

"Flexible Welded Angle Connections," by Bruce Johnston and L. F. Green, Lehigh University, Bethlehem, Pa.

(*Please turn to Page* 234)

CONTINENTAL

NEW, PATENTED
ROLL LATHE

Long a pioneer in producing the best in rolls and rolling mill equipment, Continental announces a new advanced type roll lathe.

This new lathe offers many new fine construction features. Chatterproof—noiseless—external face plate gear—no overhung gears or pinions—no bronze bearings or bushings—oil pressure lubricating—glass portholes to view headstock interior—face plate pinion supported at both ends and many other innovations in lathe construction. These lathes are built in any size to meet your requirements.

CONTINENTAL

ROLL & STEEL FOUNDRY COMPANY

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© DUQUESNE DIV., CORAOPOLIS, PA. ⓗ HUBBARD DIV., EAST CHICAGO, IND. ⓦ WHEELING DIV., WHEELING, W. VA.

"Design and Construction of Arc-Welded Steel Structures," by La Motte Grover, Air Reduction Sales Co., New York.

"Flame Cleaning of Structural Steel," by F. H. Dill, American Bridge Co., Sewickley, Pa.

Thursday, Oct. 24

9:30 A. M.—Ball Room, Mezzanine

Pipe Welding

"Pipe Welding for the Naval Service," by Bela Ronay, United States Naval Engineering Experiment Station, Annapolis, Md.

"Welding of Copper and Red Brass," by J. J. Vreeland and J. Babin, Chase Brass & Copper Co., Waterbury, Conn.

"Investigation of Gas and Arc Fillet Welds in Piping," by I. H. Carlson and Eric R. Seabloom, Crane Co., Chicago.

"Preheating — Welding — Normalizing," by C. J. Holslag, Electric Arc Cutting & Welding Co., Newark, N. J.

9:30 A. M.—Red Room, Mezzanine

Procedure Controls and Special Applications

"Cost and Procedure Control by Use of Polarized Light," by E. W. P. Smith, The Lincoln Electric Co., Cleveland.

"Training of Welding Operators," by S. Lewis Land, Supervisor of Industrial Education, New York State Department of Education, Albany, N. Y.

"Codes for Welded Pressure Vessels," by D. S. Jacobus, Babcock & Wilcox Co., New York.

"Oxyacetylene Welding of Light Aircraft," by Hanford Eckman, Piper Aircraft Corp., Lock Haven, Pa.

"Design and Construction of Large Welded Cement Kilns," by C. G. Malmberg, Allis-Chalmers Mfg. Co., Milwaukee.

2:00 P. M.

Committee Meetings

7:00 P. M.—Ball Room, Mezzanine

Annual Banquet

Friday, Oct. 25

9:30 A. M.—Ball Room, Mezzanine

Metallurgical

"Dilution of Austenitic Welds by Mild Steel and Low Alloys," by R. David Thomas Jr. and K. W. Ostrom, Arcos Corp., Philadelphia.

"Silver and Alloy Soldering," by C. Zappone, Robertshaw Thermostat Co., Youngwood, Pa.

9:30 A. M.—Red Room, Mezzanine

Railroad

"Welding in Tank Car Construction," by J. W. Sheffer, American Car & Foundry Co., New York.

"Welding of Passenger Cars," by A. M. Unger, Pullman-Standard Car Mfg. Co., Chicago.

11:30 A. M.—Red Room, Mezzanine

Business Meeting

Report of President.

Election of Officers.

Directors' Luncheon Meeting

Afternoon

Inspection Trip

A.I.M.E. Program

(*Concluded from Page 231*)

minum Co. of America, Pittsburgh.

"On the Solidification of Solid Solutions Under Equilibrium Conditions," by Morris Cohen, assistant professor, department of metallurgy, Massachusetts Institute of Technology, Cambridge, Mass., and William P. Kimball, professor, Thayer School of Civil Engineering, Dartmouth College, Hanover, N. H.

8:00 P. M.—Red Room, Mezzanine Floor

Annual Autumn Dinner.

Wednesday, Oct. 23

2:00 P. M.—Empire Room, Parlor Floor

Joint Session

Round Table Discussion, Sam Tour and Hugh E. Brown, Chairmen

Electrolytic Polishing of Metals—Metallographic and Commercial.

American Society For Metals Program (Concluded from Page 226)

Steel Wire," by H. J. Godfrey, Lehigh University, Bethlehem, Pa., Fritz Engineering Laboratory.

"The Chafing Fatigue Strength of Some Metals and Alloys," by G. Sachs and P. Stefan, Case School of Applied Science, Cleveland.

"Fatigue and Damping Studies of Aircraft Sheet Materials: Duralumin Alloy 24ST, Alclad 24ST and Several 18-8 Type Stainless Steels," by R. M. Brick and Arthur Phillips, Yale University, New Haven, Conn.

"Alloys of Manganese and Copper: Vibration-Damping Capacity," by R. S. Dean, C. T. Anderson and E. V. Potter, Bureau of Mines, U. S. Department of Interior, Salt Lake City, Utah.

5:00 P. M. Public Auditorium

Educational Lecture (See Monday)

Friday, Oct. 25

9:00 A. M. Hotel Statler

Educational Lecture (See Monday)

9:30 A. M. Hotel Statler

Symposium on Surface Treatment of Metals

"Diffusion Coatings on Metals," by F. N. Rhines, Carnegie Institute of Technology, Pittsburgh.

"Surface Reactions and Diffusion," by J. E. Dorn, J. T. Gier, L. M. K. Boelter and N. F. Ward, University of California, Berkeley, Calif.

"Heat-Treating With Induction Heat," by Edmund Blasko, Ford Motor Co., Dearborn, Mich.

"Inherent Characteristics of Induction Hardening," by M. A. Tran, Park Drop Forge Co., Cleveland, and H. B. Osborn, Ohio Crankshaft Co., Cleveland.

"Flame Pretreatment of Structural Steel Surfaces for Painting," by J. G. Magrath, Air Reduction Sales Co., New York.

1:30 P. M. Public Auditorium

Symposium on Surface Treatment of Metals

"Shot Blasting and Its Effect on Fatigue Life," by F. P. Zimmerli, Barnes Gibson Raymond, Inc., Detroit.

"Effect of Surface Conditions on Fatigue Properties," by O. J. Horger and H. R. Neifert, Timken Roller Bearing Co., Canton.

"Chip Formation, Friction and High Quality Machined Surfaces," by Hans Ernst and M. E. Merchant, Cincinnati Milling Machine Co., Cincinnati, O.

"Observations on the Tarnishing of Stainless Steels on Heating in Vacuo," by V. C. F. Holm, National Bureau of Standards, Washington, D. C.

"The Tracer Method of Measuring Surface Irregularities," by E. J. Abbott, Physicists Research Co., Ann Arbor, Mich.

The following papers will be presented by title:

"Alloys of Manganese and Copper: Electrical Resistance," by R. S. Dean and C. T. Anderson.

"The Alloys of Manganese and Copper: Hardening by Cold Work and Heat Treatment," by R. S. Dean and C. T. Anderson.

"The Alloys of Manganese-Copper and Nickel: Hardening in the Pseudo Binary System Cu-Mn-Ni," by R. S. Dean and C. T. Anderson.

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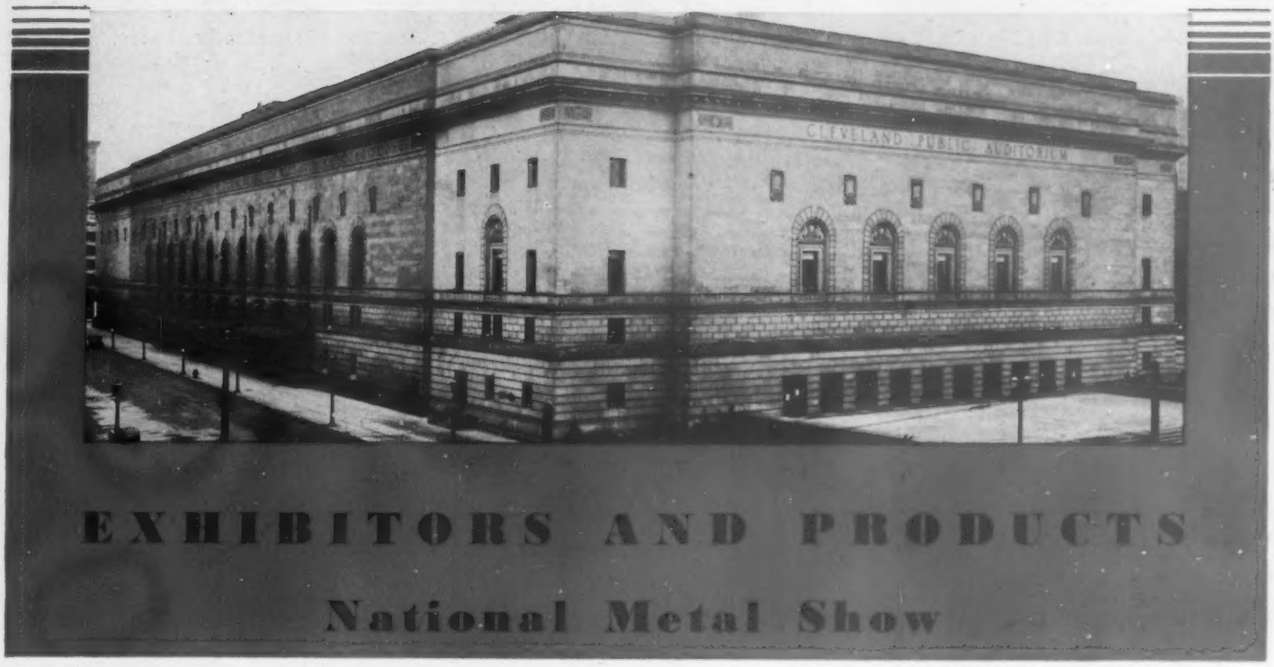

EXHIBITORS AND PRODUCTS

National Metal Show

Public Auditorium . . Cleveland . . October 21-25, 1940

EXPOSITION HOURS

Monday.....12:00 M. to 10:00 P. M.
Tuesday.....12:00 M. to 10:00 P. M.
Wednesday.....12:00 M. to 10:00 P. M.
Thursday.....12:00 M. to 6:00 P. M.
Friday.....12:00 M to 10:00 P. M.

Acme Electric Welder Co., Huntington Park, Calif...B-32
Resistance welders.

Advance Polishing Wheels Inc., Chicago.....Y-16
Polishing wheels.

Air Reduction Sales Co., New York G-20
Oxyacetylene welding and cutting apparatus.

Ajax Electric Co. Inc., Philadelphia B-38
Electric heat treating furnaces.

Ajax Electrothermic Corp., Trenton, N. J. B-38
High-frequency heat treating and melting furnaces.

Allegheny Ludlum Steel Corp., Brackenridge, Pa.....A-1
Stainless, heat-resisting steels; tool steels.

Allis-Chalmers Mfg. Co., Milwaukee Z-231
Low-current arc welder, pumps, motors, speed changers.

Alox Corp., Niagara Falls, N. Y. F-8
Corrosion preventatives and lubricants.

Aluminum Co. of America, Pittsburgh D-22
Aluminum alloys.

Alvey Ferguson Co., Cincinnati Y-52
Conveying machinery.

American Brass Co., Waterbury, Conn. E-22
Copper alloys; welding rods.

American Car & Foundry Co., New York E-26
Electric bar, forging and rivet heaters.

American Chain & Cable Co., Andrew C. Campbell Div., Bridgeport, Conn., **Page Steel & Wire Div.,** Monessen, Pa. G-4
Nibbling machines; die sets; welding wire.

American Cyanamid & Chemical Corp., New York..A-5
Case hardening and carburizing materials.

American Electric Fusion Corp., Chicago C-30
Resistance welding equipment.

American Foundry Equipment Co., Mishawaka, Ind. Z-101, Z-105
Airless abrasive cleaning and descaling equipment.

American Gas Association, New York .....Gas Section
Industrial gas equipment.

American Gas Furnace Co., Elizabeth, N. J...Gas Section
Gas heat treating furnaces; burners, accessories.

American Gasifier Co., Wallingford, Conn.....Z-127
Furnace gas generator, complete heat treating unit.

American Institute of Bolt, Nut and Rivet Manufacturers, Cleveland A-36
Educational exhibit.

American Institute of Mining and Metallurgical Engineers, New York Y-18
Educational exhibit.

American Machine & Metals Inc., Riehle Testing Machine Div., East Moline, Ill. Y-22
Testing machines.

American Machinist, New York Z-232
Publications.

American Magnesium Corp., Cleveland D-22
Magnesium and its alloys.

American Manganese Steel Div., American Brake Shoe & Foundry Co., Chicago Heights, Ill.....F-35
Alloy castings for heat and corrosion service.

American Metal Hose Div., American Brass Co., Waterbury, Conn. E-22
Flexible alloy hose and tubing.

American Metal Market, New York Z-208
Publications.

American Rolling Mill Co., Middletown, O. E-16
Specialty iron and steel sheets.

American Screw Co., Boston C-31
Bolts and screws.

American Society for Metals, Cleveland.....Z-124
Educational exhibit.

American Steel & Wire Co., Cleveland.....Z-104
Wire and rods; stainless and cold finished strip.

American Welding Society, New York.....Y-44
Educational exhibit.

Ampco Metal Inc., Milwaukee Y-26
Welding rods and high-strength nonferrous alloys.

Anderson & Sons, Westfield, Mass.....E-10
Etched and lithographed metal products.

Arcos Corp., Philadelphia C-27
Welding electrodes.

Armstrong Cork Co., Lancaster, Pa. C-8
Insulating firebrick and cements.

Atlas Publishing Co., New York.....Y-52
Publications.

Audubon Wire Cloth Corp., Philadelphia H-12
Mesh, space and flexible wire cloth; conveyor belts.

Automatic Mfg. Co. Inc., Harrison, N. J.....Y-11
Metal working machines.

Automatic Temperature Control Co. Inc., Phila.....H-31
Valves and controllers.

Automotive Industries, Philadelphia F-28
Publications.

Babcock & Wilcox Co., New York Y-54
Refractories.

Baker & Co. Inc., Newark, N .J. F-15
Platinum wire, rod and sheet.

Baldwin-Southwark Div., Baldwin Locomotive Works, Eddystone, Pa. B-27
Testing machines and accessories.

Barrett-Cravens Co., Chicago E-4
Skids, lift trucks and other handling equipment.

Bastian-Blessing Co., Chicago H-40
Oxyacetylene welding and cutting equipment.

Cyril Bath & Co., Cleveland Z-130
Metal working machines, presses and dies.

Bausch & Lomb Optical Co., Rochester, N. Y. C-14
Optical instruments for metallography, spectrography.

Bethlehem Steel Co., Bethlehem, Pa. A-22
Carbon and alloy steels; tool steels; wire.

G. S. Blakeslee & Co., Cicero, Ill. H-7
Metal cleaning and degreasing machines.

Bradley Washfountain Co., Milwaukee Z-212
Washfountains and showers.

Bridgeport Brass Co., Bridgeport, Conn. Y-27
Brass and copper mill products.

Bristol Co., Waterbury, Conn. G-7
Pyrometers; automatic control equipment.

Brown Fintube Co., Elyria, O. G-11
Fintubes for heat exchangers.

Brown Instrument Co., Philadelphia F-4
Pyrometers; automatic control equipment.

Charles Bruning Co. Inc., New York F-40
Printing machines.

Brush Development Co., Brush Beryllium Co., Cleveland Z-235
Surface smothness testers, microphones, alloys.

Adolph I. Buehler, Chicago Y-20
Metallographic and laboratory equipment.

Burdett Mfg. Co., Chicago ..... Gas Section
Radiant infra-red-ray gas burners.

Cambridge Wire Cloth Co., Cambridge, Md. C-24
Conveyor belts; screens; wire cloth; baskets.

Carboloy Co. Inc., Detroit Z-115
Cemented carbide tools and dies.

Carnegie-Illinois Steel Corp., Pittsburgh ..... Z Room
Carbon, alloy, high-tensile and stainless steels.

Carpenter Steel Co., Reading, Pa. E-27
Tool and stainless steels.

Chapman Valve Mfg. Co., Indian Orchard, Mass. .. Y-13
Valves and controls.

Chase Brass & Copper Co., Waterbury, Conn. C-21
Copper alloys; welding rods.

Chicago Flexible Shaft Co., Chicago I-7
Flexible shaft drives.

Chicago Malleable Castings Co., Chicago I-38
Special casting metals.

Cities Service Oil Co., Bartlesville, Okla. Z-244
Petroleum products.

Clark Controller Co., Cleveland E-28
Control equipment, kickless welding cable.

Clement Diamond Tools Co., Cleveland G-39
Diamond tools.

Cleveland Crane & Engineering Co., Wickliffe, O... Z-130
Cranes and tramrails, press brakes.

Cleveland Wire Spring Co., Cleveland Z-216
Wire specialties.

Climax Molybdenum Co., New York E-14
Molybdenum alloy steels and irons.

Coffing Hoist Co., Danville, Ill. G-23
Hoists.

Commerce Pattern Foundry & Machine Co., Upton Electric Furnace Div., Detroit Y-33
Electric salt bath furnaces.

Compressed Industrial Gases Inc., Chicago G-40, G-42, H-40
Industrial gases and apparatus.

Continental Industrial Engineers Inc., Chicago ..... Gas Section
Heat treating furnaces.

Copperweld Steel Co., Glassport, Pa. F-20
Alloy steels.

Cowles Detergent Co., Cleveland Z-109
Cleaners.

Crescent Machine Co., Leetonia, O. Z-234
Woodworking machinery.

Crown Rheostat & Supply Co., Chicago X-8
Plating and polishing equipment.

Crucible Furnace Co., Charlotteville, Va. Z-223
Brass and copper alloys.

Crucible Steel Co. of America, New York Y-6
Tool steels; stainless, corrosion-resisting steels.

Cyclone Fence Co., Waukegan, Ill. Z-104
Steel fence; wire products.

DAILY METAL TRADE, Cleveland X-21
Publications and technical books.

A. P. de Sanno & Son Inc., Phoenixville, Pa. H-32
Abrasive cutting and grinding equipment.

Despatch Oven Co., Minneapolis ..... Gas Section
Gas heat treating furnaces.

Detroit Rex Products Co., Detroit Y-9
Cleaning equipment.

Detroit Testing Machine Co., Detroit X-1
Physical testing machines.

Harry W. Dietert Co., Detroit G-24
Spectrographic equipment; testing equipment.

Dow Chemical Co., Midland, Mich. Y-58
Magnesium alloys.

Drever Co., Philadelphia Y-13
Industrial heating equipment.

Driver-Harris Co., Harrison, N. J. A-28
Heat and corrosion-resisting alloys.

E. I. du Pont de Nemours & Co., Wilmington, Del. . D-7
Heat treating salts; pickling inhibitors; metal cleaners; plating chemicals; fluxes; acids.

Duraloy Co., Scottsdale, Pa. G-19
Heat and corrosion resistant castings.

Eastern Cutter Salvage Co., Newark, N. J. Z-139
Tools and tool tips.

Ecco High Frequency Corp., New York Y-24
High-frequency converter equipment.

Eclipse Fuel Engineering Co., Rockford, Ill. . Gas Section
Gas heat treating furnaces and accessories.

Eisler Engineering Co., Newark, N. J. D-29
Resistance welders.

Electric Controller & Mfg. Co., Cleveland B-29
Contactors and controllers.

Electric Furnace Co., Salem, O. F-21
Heat treatment furnaces.

Electro-Alloys Co., Elyria, O. G-2
Heat and corrosion-resisting alloys.

Electro Manganese Corp., Minneapolis Y-15
Electrolytic manganese.

Electro Metallurgical Co., New York D-14
Alloy elements for iron and steel.

Electroloy Co. Inc., New York B-32
Resistance welders.

Expert Welder Co., Detroit B-32
Resistance welders.

Federal Machine & Welder Co., Warren, O. D-34
Electric welding machines.

Federal Products Corp., Providence, R. I. G-36
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Fieser-Lundt. Inc., New York ..... Gas Section
Gas burners and filters; flaring and bending tools.

Firth Sterling Steel Co., McKeesport, Pa. X-11
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Foote Bros. Gear & Machine Corp., Chicago H-3
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Forest City Foundries Co., Cleveland Y-4
Castings.

Foxboro Co., Foxboro, Mass. F-14
Automatic control instruments.

THE FOUNDRY, Cleveland X-21
Publications and technical books.

Fulton Foundry & Machine Co., Cleveland G-5
Castings.

Gas Machinery Co., Cleveland ..... Gas Section
Furnaces.

General Alloys Co., Boston Z-201
Heat and corrosion-resisting alloys.

General Electric Co., Schenectady, N. Y. A-11
Electric furnaces; atmosphere producers; welders.

General Electric X-Ray Corp., Chicago A-11
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Globar Division, Carborundum Co., Niagara Falls, N. Y. E-32
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Steel stampings, etc.

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Hardness testers.

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Haynes-Stellite Co., Kokomo, Ind. D-14
Cutting tools; hard facings; castings.

Heat Treating & Forging, Pittsburgh I-40
Publications.

Heltzel Steel Form & Iron Co., Warren, O. E-1
Steel fabrications.

Hevi Duty Electric Co., Milwaukee D-27
Electric heat treating furnaces.

Hitchcock Publishig Co., Chicago I-2
Publications.

Hobart Brothers Co., Troy, O. C-28
Arc welding equipment.

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Cold finished steels and shafting.

Hollup Corp., Chicago H-40, G-40, G-42
Arc welders; welding equipment.

Holo-Krome Screw Co., Hartford, Conn. Y-19
Socket screws.

Charles A. Hones Inc., Baldwin, N. Y. ..... Gas Section
Gas furnaces, burners and accessories.

Hoskins Mfg. Co., Detroit Y-43
Heat resisting castings, resistor alloys, chromel.

E. F. Houghton & Co., Philadelphia B-4
Heat treating salts; lubricants; cutting oil; belting.

Illinois Testing Laboratories Inc., Chicago I-12
Pyrometers; thermometers; control equipment.

Illinois Tool Works, Chicago B-14
Measuring, testing and recording instruments.

Independent Pneumatic Tool Co., Chicago F-12
Portable electric and pneumatic tools.

Industrial Heating, Pittsburgh I-8
Publications.

Industrial Publishing Co. Inc., Cleveland F-36
Publications.

Industrial Steels Inc., Cambridge, Mass. Y-13
Alloy steels, die blocks, heat treating supplies.

Ingersoll Steel & Disc Div., Borg-Warner Corp., New Castle, Ind. C-9
Alloy steels.

International Nickel Co. Inc., New York B-8
Nickel and nickel alloys.

Iron Age, New York Y-23
Publications.

Jackson Buff Co., Long Island City, N. Y. Y-21
Polishing equipment.

Johns-Manville Corp., New York A-27
Insulation materials.

Jones & Laughlin Steel Corp., Pittsburgh C-32
Hot and cold finished steels; wire.

J. W. Kelley Co., Cleveland F-29
Industrial oils; heat treating products.

C. M. Kemp Mfg. Co., Baltimore ..... Gas Section
Gas generators; immersion heating units; accessories.

Andrew King, Narberth, Pa. A-30
Portable brinell hardness testing machines.

Krouse Testing Machine Co., Columbus, O. Y-41
Repeated-stress testing machines.

Lake City Malleable Co., Cleveland Z-138
Malleable castings and bars.

Lakeside Steel Improvement Co., Cleveland E-8
Heat treated products.

La Salle Steel Co., Chicago C-18
Cold finished steels.

Leeds & Northrup Co., Philadelphia G-22
Heat treating furnaces; control instruments.

Lester Engineering Co., Cleveland Z-228
Diecasting machines.

Lepel High Frequency Laboratories Inc., New York Z-224
High-frequency converters.

Lewis Machine Co., Cleveland A-31
Wire straightening and cutting machines.

C. F. L'Hommedieu & Sons Co., Chicago C-23
Plating and polishing supplies and lathes.

Lincoln Electric Co., Cleveland B-10
Arc welding machines; electrodes; motors.

Lindberg Engineering Co., Chicago X-3
Heat treating furnaces; control equipment.

The Linde Air Products Co., New York D-14
Oxyacetylene welding and cutting apparatus.

Machine Design, Cleveland X-21
Publications.

Machinery, New York E-7
Publications.

Machinery Mfg. Co., Los Angeles F-9
Machine tools.

Macklin Co., Jackson, Mich. X-9
Grinding wheels, grinders.

Magnaflux Corp., New York C-22
Magnetic inspection equipment.

Magnetic Analysis Corp., Long Island City, N. Y. E-2
Magnetic analysis equipment.

Mahr Mfg. Div., Diamond Iron Works Inc., Minneapolis G-15
Oil and gas furnaces; burners; nitrogen generators.

P. R. Mallory & Co. Inc., Indianapolis B-32, Z-119
Welding electrode tips; electric contacts.

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Rolled and forged manganese steel; screens.

Manhattan Rubber Mfg. Co., Passaic, N. J. D-28
Abrasive cut-off and finishing wheels.

Marburg Bros. Inc., New York C-19
Metal cutting machines; gages; pneumatic hammers.

Martindale Electric Co., Cleveland Y-50
Flexible shaft units.

Master Chrome Service Inc., Cleveland Z-139
Tool salvaging; hard chrome plating.

Matchless Metal Polish Co., Chicago Y-16
Polishing compounds.

Maurath Inc., Cleveland Z-102
Welding electrodes.

McKay Co., Pittsburgh F-24
Welding electrodes; industrial chains.

Metal Finishing, New York H-38
Publications.

Metal Progress, Cleveland Z-124
Publications.

Metal & Thermit Corp., New York D-3
Welding electrodes; high-purity metals.

Metals & Alloys, New York E-3
Publications.

Metals Disintegrating Co. Inc., Elizabeth, N. J. Y-30
Metal powders.

Metlab Co., Philadelphia Y-10
Heat treated products.

Michiana Products Corp., Michigan City, Ind. H-25
Heat and corrosion-resistant alloy castings.

Mine Safety Appliances Co., Pittsburgh, Pa. E-5
Protection equipment.

Minneapolis-Honeywell Regulator Co., Minneapolis F-4
Controls.

Modern Industrial Press, Pittsburgh I-6
Publications.

Modern Machine Shop, Cincinnati I-33
Publications.

Molybdenum Corp. of America, Pittsburgh A-1A
Molybdenum, tungsten alloys; ferroalloys; metal powders.

Moore Special Tool Co., Bridgeport, Conn. C-19
Machine tools and acecssories.

Morrison Engineering Corp., Cleveland I-34
Industrial heating equipment.

Multi-Hydromatic Welding & Mfg. Co., Detroit B-32
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National Carbide Corp., New York G-20
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National Carbon Co. Inc., Electrode Sales Div., New York D-14
Carbon arc electrodes.

National Copper Paint Corp., Chicago E-6
Surface protection compounds for heat treatment.

National Cylinder Gas Co., Chicago G-40, G-42, H-40
Oxyacetylene cutting and flame hardening machines.

National Electric Welding Machines Co., Bay City, Mich. C-30
Resistance welders.

National Machine Works, Chicago ..... Gas Section
Heat treating furnaces.

National Tube Co., Pittsburgh Z-104
Seamless and welded tubular products.

New Equipment Digest, Cleveland X-21
Publications.

New Jersey Zinc Co., New York D-8
Zinc alloy diecastings.

Nicholson File Co., Providence, R. I. F-38
Files.

North American Mfg. Co., Cleveland ..... Gas Section and G-28
Burners.

Norton Co., Worcester, Mass A-9
Abrasive products.

Oakite Products Inc., New York Y-35
Cleaners.

Ohio Carbon Co., Cleveland B-2
Carbon brushes, contacts, plates, resistors and suppressors.

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Owens-Corning Fiberglas Corp., Toledo, O. Y-34

Packer Machine Co., Meriden, Conn. Y-21
Automatic polishing machines.

Pangborn Corp., Hagerstown, Md. F-22
Blast cleaning and dust collecting equipment.

Park Chemical Co., Detroit C-7
Heat treating, buffing and polishing materials.

Parker-Kalon Corp., New York G-37
Screws and fastening devices.

Partlow Corp., New Hartford, N. Y. ..... Gas Section
Temperature control equipment.

Penton Publishing Co., Cleveland X-21
Publications and technical books.

Phillips Mfg. Co., Chicago X-23
Cleaning machines.

Phoenix Machine Co., Cleveland Z-228
Diecasting and injection molding machines.

Physicists Research Co., Ann Arbor, Mich. I-4
Surface roughness testers.

Pittsburgh Crucible Steel Co., Midland, Pa. Y-6
Alloy steels; cold finished steels.

Products Finishing, Cincinnati I-33
Publications.

Progressive Welder Co., Detroit D-30
Resistance welding equipment.

Pyrometer Instrument Co., New York F-23
Pyrometers; radiation tubes.

Radium Chemical Co. Inc., New York and Chicago .. F-39
Radiographic equipment.

N. Ransohoff Inc., Cincinnati Y-38
Cleaning machines.

Ransome Concrete Machinery Co., Dunellen, N. J. .. E-12
Revolving welding tables or positioners.

Reeves Pulley Co., Columbus, Ind. Y-62
Power drives and variable speed transmissions.

Republic Steel Corp., Cleveland A-10
Alloy and stainless steels; wire; pig iron.

Resistance Welder Manufacturers' Association, Alloy Group, Philadelphia B-32
Resistance welding.

Revere Copper & Brass Inc., New York X-19
Copper and brass alloys and products.

John A. Roebling's Sons Co., Trenton, N. J. F-2
Wire, wire rope, cable.

Ruemelin Mfg. Co., Milwaukee F-7A
Fume collector, sand blast cleaning machine.

Rustless Iron & Steel Corp., Baltimore Y-31
Stainless steels and irons.

Safety Socket Screw Corp., Chicago F-33
Screw products.

Salem Engineering Co., Salem, O. X-5
Furnaces.

Sciaky Corp., Chicago A-34
Resistance welders.

Scully Steel Products Co., Chicago Z-104
Carbon, alloy, high-tensile and stainless steels.

Selas Co., Philadelphia ..... Gas Section
Gas furnaces; burners; controllers.

Sellers Engineering Co., Chicago ..... Gas Section
Industrial gas equipment.

Sentry Co., Foxboro, Mass. G-25
Hardening furnaces; high-temperature tube furnaces.

Shakeproof Lock Washer Co., Chicago B-14
Shakeproof fastening devices.

Sleeper & Hartley Inc., Worcester, Mass. B-31
Wire and spring making machinery.

S-M-S Corp., Detroit B-32
Resistance welders.

Spencer Turbine Co., Hartford, Conn. H-23
Turbo compressors; gas boosters; vacuum cleaners.

Sperry Products Inc., Hoboken, N. J. Y-10
Electromagnetic nondestructive testing equipment.

Standard Alloy Co., Cleveland I-31
Heat and acid resisting alloy diecastings.

Standard Machinery Co., Providence, R. I. Z-220
Presses and metal working equipment.

Standard Oil Co., New York Z-206
Petroleum products.

Standard Steel Spring Co., Coraopolis, Pa. X-7, X-17
Corrosion-proof coatings.

Stanley Electric Tool Division, New Britain, Conn. .. F-7
Small power tools.

STEEL, Cleveland X-21
Publications and technical books.

Sterling Grinding Wheel Co., Tiffin, O. Z-131
Grinding wheels.

Stoody Co., Whittier, Calif. D-32
Hard-facing metals.

D. A. Stuart & Co., Chicago A-23
Industrial oils and greases.

Surface Combustion Corp., Toledo, O. ..... Gas Section
Gas heat treating furnaces; burners; accessories.

Swift Electric Welder Co., Detroit B-32
Resistance welders.

C. J. Tagliabue Mfg. Co., Brooklyn, N. Y. A-19
Pyrometers; thermometers; controllers.

Taylor-Hall Welding Corp., Worcester, Mass. B-37
Resistance welders.

Taylor Winfield Corp., Warren, O. B-36
Electric welders.

Tennessee Coal, Iron & Railroad Co., Birmingham, Ala Z-104
Carbon, alloy, high-tensile and stainless steels.

Thom McAn Safety Shoes, Mellville Shoe Corp., New York I-36
Safety equipment.

Henry G. Thompson & Son Co., New Haven, Conn. .. F-5
Metal cutting saws.

Thomson-Gibb Electric Welding Co., Lynn, Mass. .. B-32
Resistance welders.

Tide Water Associated Oil Co., New York H-42
Industrial oils and greases.

Timken Roller Bearing Co., Steel and Tube Div., Canton, O. D-6
Alloy, stainless, tool and die steels.

Tinnerman Products Inc., Cleveland A-3
Fastening devices.

Titanium Alloy Mfg. Co., Niagara Falls, N. Y. F-13
Titanium; ferroalloys; refractories.

Towmotor Co., Cleveland E-36
Transportation equipment, tractors and trucks.

Una Welding Inc., Cleveland X-15
Arc welding machines; electrodes.

Union Carbide Corp., Electrode Sales Division D-14
Welding electrodes.

United States Steel Corp., Pittsburgh Z-104
Carbon, alloy, high-tensile and stainless steels.

Universal-Cyclops Steel Corp., Bridgeville, Pa. Z-123
Tool steels; stainless and specialty steels.

Vanadium-Alloys Steel Co., Pittsburgh D-23
Tool steels; vanadium alloy steels.

Vanadium Corp. of America, New York Y-2
Ferroalloys; vanadium steels and irons.

Victor Saw Works Inc., Middletown, N. Y. F-10
Hacksaw machines; hacksaw blades.

Wall-Colmonoy Corp., Detroit Y-39
Hard-facing alloys.

Welding Engineer Publishing Co., Chicago Y-48
Publications.

Welding Engineering Co., Milwaukee I-4A
Arc welding equipment and supplies.

Welding Machines Mfg. Co., Detroit C-33
Portable gun welding equipment.

Welding Sales & Engineering Co., Detroit B-32
Resistance welders.

Wells Mfg. Corp., Three Rivers, Mich. G-27
Metal bandsaws.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. B-22
Welding equipment; special alloys.

Wheelco Instruments Co., Chicago F-19
Pyrometers; thermometers; control equipment.

S. B. Whistler & Sons Inc., Buffalo Z-246
Dies, tools and stampings.

Williams & Co. Inc., Pittsburgh H-33
Welders, electrodes, hard-facing alloys.

Willson Products Inc., Reading, Pa. Z-236
Safety appliances.

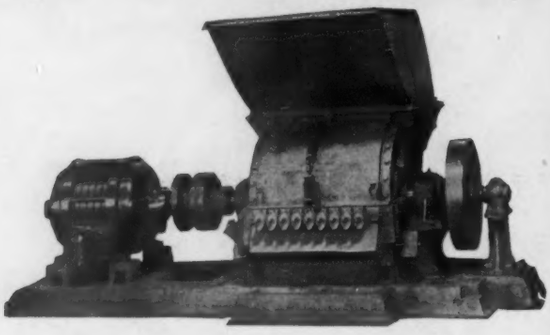
Wilson Mechanical Instrument Co. Inc., New York .. C-10
Hardness testing machines.

Wilson Welder & Metals Co. Inc., New York G-20
Arc welding machines; electrodes.

Wire Association, Stamford, Conn. F-32
Educational exhibit.

Youngstown Sheet & Tube Co., Youngstown, O. F-18
Alloy and high-tensile steels.

BIG RETURNS
ON A SMALL INVESTMENT



No. 3800 American Steel Turnings Crusher with hopper mounted on bed plate. (Patented)

Feed Platform with Steel Turnings

Many shops and manufacturing plants are making extra profits by crushing their turnings into chips with **AMERICAN RING STEEL TURNING CRUSHERS.** Chips not only bring a higher price but are easier to handle, require less storage space and are easier to ship.

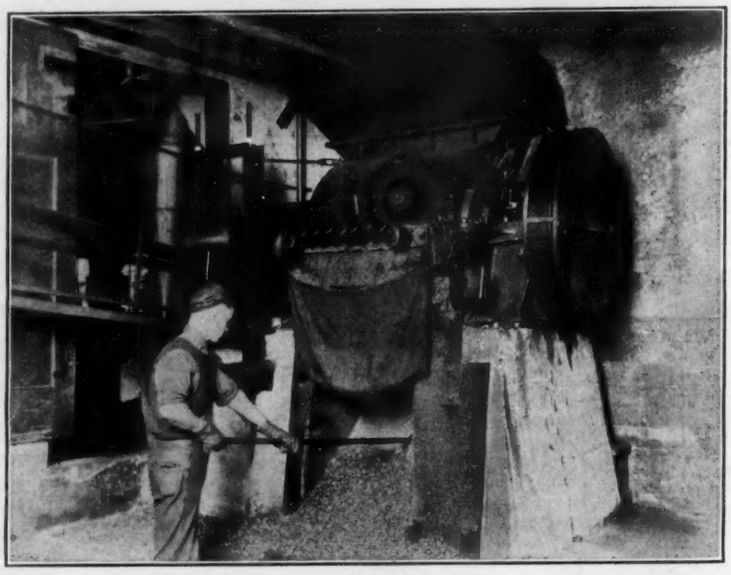
Your long turnings will cease to be a nuisance after you put an **AMERICAN RING CRUSHER** on the job. It will pay for itself in a very short time after which it will pay you a steady profit.

Do you want this **EXTRA** profit?

Write us for full particulars.

American Ring Crushers are crushing run of mine coal to stoker size at maintenance cost as low as 1/10 of a cent a ton

We manufacture a complete line of reduction equipment. Put your problems up to us.



A Typical Installation

ORIGINATORS OF THE ROLLING RING CRUSHER PRINCIPLE

AMERICAN PULVERIZER CO.

1539 Macklind Ave., St. Louis, Mo.

Steelmakers Ready For Defense Demands

Buying continues to exceed output. Delivery is further extended. Railroad buying looms as strong factor. Ingot rate moving upward

MARKET IN TABLOID ★

Demand
Consistently heavy, exceeding production.

Prices
Steady in nearly all products.

Production
Up 1 point to 94½ per cent.

■ STEELMAKERS express confidence in their ability to fill all demands laid on them for defense purposes, in the face of almost full capacity production under present conditions. Only a narrow margin remains for increasing production and inevitable delays for open-hearth repairs are constantly encountered.

Production last week advanced 1 point to 94½ per cent of capacity, the highest rate this year and ½-point above the 1939 peak. Gains by individual districts were small. Pittsburgh advanced 1 point to 88½ per cent, Detroit 2 points to 96, New England 4 points to 92, Eastern Pennsylvania 1 point to 93, Chicago ½-point to 98 and Youngstown 3 points to 88 per cent. Rates were held unchanged in six districts: St. Louis 82½, Birmingham 97, Cincinnati 90, Wheeling 97, Buffalo 90½ and Cleveland 88.

Every indication is that production will be continued at a high rate and new records may be attained. Tightness is appearing here and there and in some instances only regular customers can place further tonnage. Deliveries are being extended, though not yet sufficiently to cause inconvenience. Some barmakers can promise nothing short of Dec. 1. Sheet deliveries are not yet difficult, three to five weeks being possible. Stainless steel sheets are as much as eight weeks in arrears.

Orders are being booked consistently in excess of production and backlogs are increasing. No hint of priority regulations has been heard and mills and consumers operate on a voluntary selection when the question arises as to delivery of public and private requirements.

Buyers feel some concern over ability to obtain supplies after defense projects get under way and are placing further orders for first quarter delivery, more interested in a place on mill books than in prices then prevailing.

Cessation of scrap exports to Japan the middle of this week has had no definite effect on the domestic market. Suggestions that scrap prices be pegged against further advance have not taken definite form and were not discussed at a recent meeting of steel and scrap men with the national defense advisory commission. Strength continues and prices are being advanced in various markets on numerous grades. Local weakness in heavy melting steel at Chicago caused a drop of 8 cents in the scrap composite, to $20.54. On the other hand, the finished iron and steel composite rose 2 cents, to $38.07.

Railroad activity is a strong factor, promising heavy orders through the remainder of the year, although they may not equal the record of the closing months last year. Car orders so far this month aggregate 1700 and inquiries are out for 10,000, in addition to 28,000 which the Pennsylvania railroad is said to be planning. Inquiries include 500 to 2000 by the Northern Pacific, 1200 for the Erie, 2000 for Great Northern, 750 for the Lehigh Valley and 1000 refrigerators for the Pacific Fruit Express. Rail buying includes 71,000 tons, including fastenings, by the New York Central, and 30,000 by the Southern Railway.

Evidence of the faster tempo of production is offered in the report of finished steel shipments of the United States Steel Corp. Daily average shipments in September were 58,034 net tons, against 53,911 tons in August. Inasmuch as there were only 24 working days in September and 27 in August the September total shipments were only 1,392,838 tons, compared with 1,455,604 tons in August.

Steel ingot production in September totaled 5,895,232 net tons, slightly under 6,033,037 tons in August because of one less working day. The average daily output rose from 1,361,859 tons in August to 1,377,391 tons in September. This is the highest daily output since last November. Mills were engaged at 90.75 per cent of capacity. Production for nine months aggregated 46,201,463 tons, compared with 33,535,012 tons in the corresponding period last year.

Automobile output grows, production last week reaching 107,957 units, a gain of 2804 over the preceding week, when 105,153 were turned out. In the corresponding week last year production was 75,860. Peak of assemblies probably will be reached at an earlier date than a year ago, as fall activity is much greater.

COMPOSITE MARKET AVERAGES

	Oct. 12	Oct. 5	Sept. 28	One Month Ago Sept., 1940	Three Months Ago July, 1940	One Year Ago Oct., 1939	Five Years Ago Oct., 1935
Iron and Steel....	$38.07	$38.05	$37.98	$37.93	$37.63	$37.62	$32.84
Finished Steel	56.60	56.60	56.60	56.60	56.60	55.90	53.70
Steelworks Scrap..	20.54	20.62	20.46	20.05	18.56	21.45	12.72

Iron and Steel Composite:—Pig iron, scrap, billets, sheet bars, wire rods, tin plate, wire, sheets, plates, shapes, bars, black pipe, rails, alloy steel, hot strip, and cast iron pipe at representative centers. Finished Steel Composite:—Plates, shapes, bars, hot strip, nails, tin plate, pipe. Steelworks Scrap Composite:—Heavy melting steel and compressed sheets.

COMPARISON OF PRICES

Representative Market Figures for Current Week; Average for Last Month, Three Months and One Year Ago

Finished Material

	Oct. 12, 1940	Sept. 1940	July 1940	Oct. 1939
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Iron bars, Chicago	2.25	2.15	2.15	2.15
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.275
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.00
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	5.00	5.00	5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.50

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	1.92

Pig Iron

	Oct. 12, 1940	Sept. 1940	July 1940	Oct. 1939
Bessemer, del. Pittsburgh	$24.34	$24.34	$24.34	$24.34
Basic, Valley	22.50	22.50	22.50	22.50
Basic, eastern, del. Philadelphia	24.34	24.34	24.34	24.34
No. 2 foundry, Pittsburgh	24.21	24.21	24.21	24.21
No. 2 foundry, Chicago	23.00	23.00	23.00	23.00
Southern No. 2, Birmingham	19.38	19.38	19.38	19.38
Southern No. 2 del. Cincinnati	22.89	22.89	22.89	22.89
No. 2X, del. Phila. (differ. av.)	25.215	25.215	25.215	25.215
Malleable, Valley	23.00	23.00	23.00	23.00
Malleable, Chicago	23.00	23.00	23.00	23.00
Lake Sup., charcoal, del. Chicago	30.34	30.34	30.34	30.34
Gray forge, del. Pittsburgh	23.17	23.17	23.17	23.17
Ferromanganese, del. Pittsburgh	125.33	125.33	125.33	105.33

Scrap

Heavy melt. steel, Pitts.	$21.50	$20.15	$19.55	$23.15
Heavy melt. steel, No. 2, E. Pa.	19.75	19.69	17.50	20.00
Heavy melting steel, Chicago	19.75	19.31	17.45	19.25
Rails for rolling, Chicago	24.25	21.37	21.65	21.90
Railroad steel specialties, Chicago	23.25	21.62	21.00	21.75

Coke

Connellsville, furnace, ovens	$4.75	$4.75	$4.75	$4.75
Connellsville, foundry, ovens	5.75	5.75	5.75	5.80
Chicago, by-product fdry., del.	11.75	11.25	11.25	10.50

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Except when otherwise designated, prices are base, f.o.b. cars.

Sheet Steel

Hot Rolled

Pittsburgh	2.10c
Chicago, Gary	2.10c
Cleveland	2.10c
Detroit, del.	2.20c
Buffalo	2.10c
Sparrows Point, Md.	2.10c
New York, del.	2.34c
Philadelphia, del.	2.27c
Granite City, Ill.	2.20c
Middletown, O.	2.10c
Youngstown, O.	2.10c
Birmingham	2.10c
Pacific Coast ports	2.65c

Cold Rolled

Pittsburgh	3.05c
Chicago, Gary	3.05c
Buffalo	3.05c
Cleveland	3.05c
Detroit, delivered	3.15c
Philadelphia, del.	3.37c
New York, del.	3.39c
Granite City, Ill.	3.15c
Middletown, O.	3.05c
Youngstown, O.	3.05c
Pacific Coast ports	3.70c

Galvanized No. 24

Pittsburgh	3.50c
Chicago, Gary	3.50c
Buffalo	3.50c
Sparrows Point, Md.	3.50c
Philadelphia, del.	3.67c
New York, delivered	3.74c
Birmingham	3.50c
Granite City, Ill.	3.60c
Middletown, O.	3.50c
Youngstown, O.	3.50c
Pacific Coast ports	4.05c

Black Plate, No. 29 and Lighter

Pittsburgh	3.05c
Chicago, Gary	3.05c
Granite City, Ill.	3.15c

Long Ternes No. 24 Unassorted

Pittsburgh, Gary	3.80c
Pacific Coast	4.55c

Enameling Sheets

	No. 10	No. 20
Pittsburgh	2.75c	3.35c
Chicago, Gary	2.75c	3.35c
Granite City, Ill.	2.85c	3.45c
Youngstown, O.	2.75c	3.35c
Cleveland	2.75c	3.35c
Middletown, O.	2.75c	3.35c
Pacific Coast	3.40c	4.00c

Corrosion and Heat-Resistant Alloys

Pittsburgh base, cents per lb.

Chrome-Nickel

	No. 302	No. 304
Bars	24.00	25.00
Plates	27.00	29.00
Sheets	34.00	36.00
Hot strip	21.50	23.50
Cold strip	28.00	30.00

Straight Chromes

	No. 410	No. 430	No. 442	No. 446
Bars	18.50	19.00	22.50	27.50
Plates	21.50	22.00	25.50	30.50
Sheets	26.50	29.00	32.50	36.50
Hot strip	17.00	17.50	24.00	35.00
Cold stp.	22.00	22.50	32.00	52.00

Steel Plate

Pittsburgh	2.10c
New York, del.	2.29c
Philadelphia, del.	2.15c
Boston, delivered	2.46c
Buffalo, delivered	2.33c
Chicago or Gary	2.10c
Cleveland	2.10c
Birmingham	2.10c
Coatesville, Pa.	2.10c
Sparrows Point, Md.	2.10c
Claymont, Del.	2.10c
Youngstown	2.10c
Gulf ports	2.45c
Pacific Coast ports	2.65c

Steel Floor Plates

Pittsburgh	3.35c
Chicago	3.35c
Gulf ports	3.70c
Pacific Coast ports	4.00c

Structural Shapes

Pittsburgh	2.10c
Philadelphia, del.	2.21½c
New York, del.	2.27c
Boston, delivered	2.41c
Bethlehem	2.10c
Chicago	2.10c
Cleveland, del.	2.30c
Buffalo	2.10c
Gulf ports	2.45c
Birmingham	2.10c
St. Louis, del.	2.34c
Pacific Coast ports	2.75c

Tin and Terne Plate

Tin Plate, Coke (base box)

Pittsburgh, Gary, Chicago	$5.00
Granite City, Ill.	5.10

Mfg. Terne Plate (base box)

Pittsburgh, Gary, Chicago	$4.30
Granite City, Ill.	4.40

Bars

Soft Steel

(*Base, 20 tons or over*)

Pittsburgh	2.15c
Chicago or Gary	2.15c
Duluth	2.25c
Birmingham	2.15c
Cleveland	2.15c
Buffalo	2.15c
Detroit, delivered	2.25c
Philadelphia, del.	2.47c
Boston, delivered	2.52c
New York, del.	2.49c
Gulf ports	2.50c
Pacific Coast ports	2.80c

Rail Steel

(*Base, 5 tons or over*)

Pittsburgh	2.05c
Chicago or Gary	2.05c
Detroit, delivered	2.15c
Cleveland	2.05c

Buffalo	2.05c
Birmingham	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.70c

Iron

Chicago	2.25c
Philadelphia, del.	2.37c
Pittsburgh, refined	3.50-8.00c
Terre Haute, Ind.	2.15c

Reinforcing
New Billet Bars, Base

Chicago, Gary, Buffalo, Cleve., Birm., Young., Sparrows Pt., Pitts.	2.15c
Gulf ports	2.50c
Pacific Coast ports	2.60c

Rail Steel Bars, Base

Pittsburgh, Gary, Chicago, Buffalo, Cleveland, Birm.	2.05c
Gulf ports	2.40c
Pacific Coast ports	2.50c

Wire Products

Pitts.-Cleve.-Chicago-Birm. base per 100 lb. keg in carloads

Standard and cement coated wire nails	$2.55

(Per Pound)

Polished fence staples	2.55c
Annealed fence wire	3.05c
Galv. fence wire	3.40c
Woven wire fencing (base C. L. column)	67
Single loop bale ties, (base C.L. column)	56
Galv. barbed wire, 80-rod spools, base column	70
Twisted barbless wire, column	70

To Manufacturing Trade

Base, Pitts. - Cleve. - Chicago Birmingham (except spring wire)	
Bright bess., basic wire.	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Worcester, Mass., $2 higher on bright basic and spring wire.

Cut Nails

Carload, Pittsburgh, keg $3.85

Cold-Finished Bars

	Carbon	Alloy
Pittsburgh	2.65c	3.35c
Chicago	2.65c	3.35c
Gary, Ind.	2.65c	3.35c
Detroit	2.70c	*3.45c
Cleveland	2.65c	3.35c
Buffalo	2.65c	3.35c

*Delivered.

Alloy Bars (Hot)

(Base, 20 tons or over)

Pittsburgh, Buffalo, Chicago, Massillon, Canton, Bethlehem	2.70c
Detroit, delivered	2.80c

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	3100	0.70
2100	0.75	3200	1.35
2300	1.70	3300	3.80
2500	2.55	3400	3.20

4100 0.15 to 0.25 Mo.	0.55
4600 0.20 to 0.30 Mo. 1.50-2.00 Ni.	1.20
5100 0.80-1.10 Cr.	0.45
5100 Cr. spring flats	0.15
6100 bars	1.20
6100 spring flats	0.85
Cr. N., Van.	1.50
Carbon Van.	0.85
9200 spring flats	0.15
9200 spring rounds, squares	0.40

Electric furnace up 50 cents.

Alloy Plates (Hot)

Pittsburgh, Chicago, Coatesville, Pa. 3.50c

Strip and Hoops

(Base, hot strip, 1 ton or over; cold, 3 tons or over)

Hot Strip, 12-inch and less

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, Birmingham	2.10c
Detroit, del.	2.20c
Philadelphia, del.	2.42c
New York, del.	2.46c
Pacific Coast ports	2.75c
Cooperage hoop, Young., Pitts.; Chicago, Birm.	2.20c

Cold strip, 0.25 carbon and under, Pittsburgh, Cleveland, Youngstown 2.80c
Chicago 2.90c
Detroit, del. 2.90c
Worcester, Mass. 3.00c

Carbon	Cleve., Pitts.
0.26—0.50	2.80c
0.51—0.75	4.30c
0.76—1.00	6.15c
Over 1.00	8.35c

Worcester, Mass. $4 higher.

Commodity Cold-Rolled Strip

Pitts.-Cleve.-Youngstown	2.95c
Chicago	3.05c
Detroit, del.	3.05c
Worcester, Mass.	3.35c

Lamp stock up 10 cents.

Rails, Fastenings

(Gross Tons)

Standard rails, mill	$40.00
Relay rails, Pittsburgh 20—100 lbs.	32.50-35.50
Light rails, billet qual., Pitts., Chicago, B'ham.	$40.00
Do., rerolling quality	39.00

Cents per pound

Angle bars, billet, mills.	2.70c
Do., axle steel	2.35c
Spikes, R. R. base	3.00c
Track bolts, base	4.15c
Car axles forged, Pitts., Chicago, Birmingham.	3.15c
Tie plates, base	2.15c

Base, light rails 25 to 60 lbs., 20 lbs., up $2; 16 lbs. up $4; 12 lbs. up $8; 8 lbs. up $10. Base railroad spikes 200 kegs or more; base plates 20 tons.

Bolts and Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	68 off
Do., ⅝ and ¾ x 6-in. and shorter	66 off
Do., ¾ to 1 x 6-in. and shorter	64 off
1⅛ and larger, all lengths	62 off
All diameters, over 6-in. long	62 off
Tire bolts	52.5 off

Stove Bolts

In packages with nuts separate 72.5-10 off; with nuts attached 72.5 off; bulk 82 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	60 off
Plow bolts	68.5 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less.	66	70
⅝-1-inch	63	65
1⅛-1½-inch	61	62
1⅝ and larger	60	..

Hexagon Cap Screws

Upset 1-in., smaller	70.0 off

Square Head Set Screws

Upset, 1-in., smaller	75.0 off
Headless set screws	64.0 off

Piling

Pitts., Chgo., Buffalo	2.40c
Gulf ports	2.85c
Pacific Coast ports	2.95c

Rivets, Washers

F.o.b. Pitts., Cleve., Chgo., Bham.

Structural	3.40c
⅞-inch and under	65-10 off

Wrought washers, Pitts., Chi., Phila., to jobbers and large nut, bolt mfrs. l.c.l. $5.40; c.l. $5.75 off

Welded Iron, Steel Pipe

Base discounts on steel pipe. Pitts., Lorain, O., to consumers in carloads. Gary, Ind., 2 points less on butt weld. Chicago delivery 2½ and 1½ less, respectively. Wrought pipe, Pittsburgh base.

Butt Weld

Steel

In.	Blk.	Galv.
½	63½	54
¾	66½	58
1—3	68½	60½

Iron

¾	30	13
1—1¼	34	19
1½	38	21½
2	37½	21

Lap Weld

Steel

2	61	52½
2½—3	64	55½
3½—6	66	57½
7 and 8	65	55½

Iron

2	30½	15
2½—3½	31½	17½
4	33½	21
4½—8	32½	20
9—12	28½	15

Line Pipe

Steel

1 to 3, butt weld	67½
2, lap weld	60
2½ to 3, lap weld	63
3½ to 6, lap weld	65
7 and 8, lap weld	64

Iron

	Blk.	Galv.
¾ butt weld	25	7
1 and 1¼ butt weld	29	13
1½ butt weld	33	15½
2 butt weld	32½	15
1½ lap weld	23½	7
2 lap weld	25½	9
2½ to 3½ lap weld	26½	11½
4 lap weld	28½	15
4½ to 8 lap weld	27½	14
9 to 12 lap weld	23½	9

Boiler Tubes

Carloads minimum wall seamless steel boiler tubes, cutlengths 4 to 24 feet; f.o.b. Pittsburgh, base price per 100 feet subject to usual extras.

Lap Welded

Sizes	Gage	Steel	Charcoal Iron
1½" O.D.	13	$ 9.72	$23.71
1¾" O.D.	13	11.06	22.93
2" O.D.	13	12.38	19.35
2¼" O.D.	13	13.79	21.68
2¼" O.D.	12	15.16	.....
2½" O.D.	12	16.58	26.57
2¾" O.D.	12	17.54	29.00
3" O.D.	12	18.35	31.36
3½" O.D.	11	23.15	39.81
4" O.D.	10	28.66	49.90
5" O.D.	9	44.25	73.93
6" O.D.	7	68.14	.....

Seamless

Sizes	Gage	Hot Rolled	Cold Drawn
1" O.D.	13	$ 7.82	$ 9.01
1¼" O.D.	13	9.26	10.67
1½" O.D.	13	10.23	11.79
1¾" O.D.	13	11.64	13.42
2" O.D.	13	13.04	15.03
2¼" O.D.	13	14.54	16.76
2¼" O.D.	12	16.01	18.45
2½" O.D.	12	17.54	20.21
2¾" O.D.	12	18.59	21.42
3" O.D.	12	19.50	22.48
3½" O.D.	11	24.62	28.37
4" O.D.	10	30.54	35.20
4½" O.D.	10	37.35	43.04
5" O.D.	9	46.87	54.01
6" O.D.	7	71.96	82.93

Cast Iron Pipe

Class B Pipe—Pet Net Ton

6-in., & over, Birm.	$45.00-46.00
4-in., Birmingham	48.00-49.00
4-in., Chicago	56.80-57.80
6-in. & over, Chicago	53.80-54.80
6-in. & over, east fdy.	49.00
Do., 4-in.	52.00

Class A Pipe $3 over Class B Stnd. fitgs., Birm., base $100.00.

Semifinished Steel

Rerolling Billets, Slabs
(Gross Tons)

Pittsburgh, Chicago, Gary, Cleve., Buffalo, Youngs., Birm., Sparrows Point	$34.00
Duluth (billets)	36.00
Detroit, delivered	36.00

Forging Quality Billets

Pitts., Chi., Gary, Cleve., Young, Buffalo, Birm.	40.00
Duluth	42.00

Sheet Bars

Pitts., Cleveland, Young., Sparrows Point, Buffalo, Canton, Chicago	34.00
Detroit, delivered	36.00

Wire Rods

Pitts., Cleveland, Chicago, Birmingham No. 5 to ⅜-inch incl. (per 100 lbs.)	$2.00
Do., over ⅜ to 41/64-in. incl.	2.15

Worcester up $0.10; Galveston up $0.25; Pacific Coast up $0.50.

Skelp

Pitts., Chi., Youngstown, Coatesville, Sparrows Pt.	1.90c

Coke

Price Per Net Ton
Beehive Ovens

Connellsville, fur.	$4.35- 4.60
Connellsville, fdry.	5.25- 5.50
Connell, prem. fdry.	5.75- 6.25
New River fdry.	6.25- 6.50
Wise county fdry	5.50- 6.50
Wise county fur.	5.00- 5.25

By-Product Foundry

Newark, N. J., del.	11.38-11.85
Chicago, outside del.	11.00
Chicago, delivered	11.75
Terre Haute, del.	11.25
Milwaukee, ovens	11.75
New England, del.	12.50
St Louis, del.	11.75
Birmingham, ovens	7.50
Indianapolis, del.	11.25
Cincinnati, del.	11.00
Cleveland, del.	11.55
Buffalo, del.	11.25
Detroit, del.	11.00
Philadelphia, del.	11.15

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	27.00c
Solvent naphtha	26.00c
Industrial xylol	26.00c

Per lb. f.o.b. Frankford and St. Louis

Phenol (less than 1000 lbs.)	14.75c
Do. (1000 lbs. or over)	13.75c

Eastern Plants, per lb.

Naphthalene flakes, balls, bbls. to jobbers	7.00c

Per ton, bulk, f.o.b. port

Sulphate of ammonia	$28.00

Pig Iron

Delivered prices include switching charges only as noted. No. 2 foundry is 1.75-2.25 sil.; 25c diff. for each 0.25 sil. above 2.25 sil.; 50c diff. below 1.75 sil. Gross tons.

Basing Points:	No. 2 Fdry.	Malleable	Basic	Bessemer
Bethlehem, Pa.	$24.00	$24.50	$23.50	$25.00
Birmingham, Ala.‡	19.38	.....	18.38	24.00
Birdsboro, Pa.	24.00	24.50	23.50	25.00
Buffalo	23.00	23.50	22.00	24.00
Chicago	23.00	23.00	22.50	23.50
Cleveland	23.00	23.00	22.50	23.50
Detroit	23.00	23.00	22.50	23.50
Duluth	23.50	23.50	.....	24.00
Erie, Pa.	23.00	23.50	22.50	24.00
Everett, Mass.	24.00	24.50	23.50	25.00
Granite City, Ill.	23.00	23.00	22.50	23.50
Hamilton, O.	23.00	23.00	22.50	.....
Neville Island, Pa.	23.00	23.00	22.50	23.50
Provo, Utah	22.00	.....	.....	.....
Sharpsville, Pa.	23.00	23.00	22.50	23.50
Sparrow's Point, Md.	24.00	.....	23.50	.....
Swedeland, Pa.	24.00	24.50	23.50	25.00
Toledo, O.	23.00	23.00	22.50	23.50
Youngstown, O.	23.00	23.00	22.50	23.50
Delivered from Basing Points:				
Akron, O., from Cleveland	24.39	24.39	23.89	24.89
Baltimore from Birmingham	24.78	.....	23.66	.....
Boston from Birmingham	24.12	.....	.....	.....
Boston from Everett, Mass.	24.50	25.00	24.00	25.50
Boston from Buffalo	24.50	25.00	24.00	25.50
Brooklyn, N. Y., from Bethlehem	26.50	27.00	.....	.....
Canton, O., from Cleveland	24.39	24.39	23.89	24.89
Chicago from Birmingham	†23.22	.....	.....	.....
Cincinnati from Hamilton, O.	23.24	24.11	23.61	.....
Cincinnati from Birmingham	23.06	.....	22.06	.....
Cleveland from Birmingham	23.32	.....	22.82	.....
Mansfield, O., from Toledo, O.	24.94	24.94	24.44	24.44
Milwaukee from Chicago	24.10	24.10	23.60	24.60
Muskegon, Mich., from Chicago, Toledo or Detroit	26.19	26.19	25.69	26.69
Newark, N. J., from Birmingham	25.15	.....	.....	.....
Newark, N. J., from Bethlehem	25.53	26.03	.....	.....
Philadelphia from Birmingham	24.46	.....	23.96	.....
Philadelphia from Swedeland, Pa.	24.84	25.34	24.34	.....
Pittsburgh district from Neville Island	∫Neville base, plus 69c, 84c, and $1.24 freight.			
Saginaw, Mich., from Detroit	25.31	25.31	24.81	25.81
St. Louis, northern	23.50	23.50	23.00	.....
St. Louis from Birmingham	†23.12	.....	22.62	.....
St. Paul from Duluth	25.63	25.63	.....	26.13

‡Subject to 38 cents deduction for 0.70 per cent phosphorus or higher.

†Over 0.70 phos.

Low Phos.

Basing Points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $28.50, base; $29.74 delivered Philadelphia.

Gray Forge

Valley furnace $22.50
Pitts. dist. fur. 22.50

Charcoal

Lake Superior fur. $27.00
do., del. Chicago 30.34
Lyles, Tenn. 26.50

†Silvery

Jackson county, O., base: 6-6.50 per cent $28.50; 6.51-7—$29.00; 7-7.50—$29.50; 7.51-8—$30.00; 8-8.50—$30.50; 8.51-9—$31.00; 9-9.50—$31.50; Buffalo, $1.25 higher.

Bessemer Ferrosilicon†

Jackson county, O., base; Prices are the same as for silveries, plus $1 a ton.

†The lower all-rail delivered price from Jackson, O., or Buffalo is quoted with freight allowed.

Manganese differentials in silvery iron and ferrosilicon, 2 to 3%, $1 per ton add. Each unit over 3%, add $1 per ton.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick

Super Quality

Pa., Mo., Ky. $60.80

First Quality

Pa., Ill., Md., Mo., Ky. ... 47.50
Alabama, Georgia 47.50
New Jersey 52.50

Second Quality

Pa., Ill., Ky., Md., Mo. ... 42.75
Georgia, Alabama 34.20
New Jersey 49.00

Ohio

First quality 39.90
Intermediate 36.10
Second quality 31.35

Malleable Bung Brick

All bases $56.05

Silica Brick

Pennsylvania $47.50
Joliet, E. Chicago 55.10
Birmingham, Ala. 47.50

Ladle Brick

(Pa., O., W. Va., Mo.)

Dry press $28.00
Wire cut 26.00

Magnesite

Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk 22.00
net ton, bags 26.00

Basic Brick

Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.

Chrome brick $50.00
Chem. bonded chrome ... 50.00
Magnesite brick 72.00
Chem. bonded magnesite 61.00

Fluorspar

Washed gravel, duty pd., tide, net ton $25.00-$26.00
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail 19.00
Do. barge 19.00
No. 2 lump 20.00

Ferroalloy Prices

Ferromanganese, 78-82%, carlots, duty pd. $120.00
Ton lots 130.00
Less ton lots 133.50
Less 200 lb. lots 138.00
Do., carlots del. Pitts. 125.33

Spiegeleisen, 19-21% dom. Palmerton, Pa., spot .. 36.00
Do., 26-28% 49.50

Ferrosilicon, 50%, freight allowed, c.l. 74.50
Do., ton lot 87.00
Do., 75 per cent 135.00
Do., ton lots 151.00
Spot, $5 a ton higher.

Silicomanganese, c.l., 2¼ per cent carbon 118.00
2% carbon, 108.00; 1%, 133.00
Contract ton price $12.50 higher; spot $5 over contract.

Ferrotungsten, stand., lb. con. del. cars 1.90-2.00

Ferrovanadium, 35 to 40%, lb., cont. .. 2.70-2.80-2.90

Ferrophosphorus, gr. ton, c.l., 17-18% Rockdale, Tenn., basis, 18%, $3 unitage, 58.50; electric furn., per ton, c. l., 23-26% f.o.b. Mt. Pleasant, Tenn., 24% $3 unitage 75.00

Ferrochrome, 66-70 chromium, 4-6 carbon, cts. lb., contained cr., del. carlots 11.00c
Do., ton lots 11.75c
Do., less-ton lots 12.00c

67-72% low carbon:

	Carloads	Ton lots	Less ton
2% carb.	17.50c	18.25c	18.75c
1% carb.	18.50c	19.25c	19.75c
0.10% carb.	20.50c	21.25c	21.75c
0.20% carb.	19.50c	20.25c	20.75c

Spot ¼c higher

Ferromolybdenum, 55-65% molyb. cont., f.o.b. mill, lb. 0.95

Calcium molybdate, lb. molyb. cont., f.o.b. mill 0.80

Ferrotitanium, 40-45%, lb., con. ti., f.o.b. Niagara Falls, ton lots ... $1.23
Do., less-ton lots 1.25
20-25% carbon, 0.10 max., ton lots, lb. 1.35
Do., less-ton lots 1.40
Spot 5c higher

Ferrocolumbium, 50-60%, contract, lb. con. col., f.o.b. Niagara Falls ... $2.25
Do., less-ton lots 2.30
Spot is 10c higher

Technical molybdenum trioxide, 53 to 60% molybdenum, lb. molyb. cont., f.o.b. mill 0.80

Ferro-carbon-titanium, 15-18%, ti., 6-8% carb., carlots, contr., net ton $142.50
Do., spot 145.00
Do., contract, ton lots 145.00
Do., spot, ton lots 150.00

15-18% ti., 3-5% carbon, carlots, contr., net ton 157.50
Do., spot 160.00
Do., contract, ton lots. 160.00
Do., spot, ton lots 165 00

Alsifer, contract carlots, f.o.b. Niagara Falls, lb. 7.50c
Do., ton lots 8.00c
Do., less-ton lots 8.50c
Spot ½c lb. higher

Chromium Briquets, contract, freight allowed, lb. spot carlots, bulk 7.00c
Do., ton lots 7.50c
Do., less-ton lots 7.75c
Do., less 200 lbs. 8.00c
Spot, ¼c higher.

Tungsten Metal Powder, according to grade, spot shipment, 200-lb. drum lots, lb. $2.50
Do., smaller lots 2.60

Vanadium Pentoxide, contract, lb. contained $1.10
Do., spot 1.15

Chromium Metal, 98% cr., 0.50 carbon max., contract, lb. con. chrome 84.00c
Do., spot 89.00c
88% chrome, contract ... 83.00c
Do., spot 88.00c

Silicon Metal, 1% iron, contract, carlots, 2 x ⅛-in., lb. 14.00c
Do., 2% 12.50c
Spot ¼c higher

Silicon Briquets, contract carloads, bulk, freight allowed, ton $69.50
Ton lots 79.50
Less-ton lots, lb. 3.75c
Less 200 lb. lots, lb. 4.00c
Spot ¼-cent higher.

Manganese Briquets, contract carloads, bulk freight allowed, lb. 5.00c
Ton lots 5.50c
Less-ton lots 5.75c
Spot ¼c higher

Zirconium Alloy, 12-15%, contract, carloads, bulk, gross ton 102.50
Do., spot 107.50
34-40%, contract, carloads, lb., alloy 14.00c
Do., ton lots 15.00c
Do., less-ton lots 16.00c
Spot ¼c higher

Molybdenum Powder, 99%, f.o.b. York, Pa. 200-lb. kegs, lb. $2.60
Do., 100-200 lb. lots .. 2.75
Do., under 100-lb. lots 3.00

Molybdenum Oxide Briquets, 48-52% molybdenum, per pound contained, f.o.b. producers' plant 80.00c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials

	Soft Bars	Bands	Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets: Hot Rolled	Sheets: Cold Rolled	Sheets: Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars: Carbon	Cold Drawn Bars: S.A.E. 2300	Cold Drawn Bars: S.A.E. 3100
Boston	3.98	3.86	4.86	3.85	3.85	5.66	3.51	4.48	4.66	3.46	4.13	8.63	7.23
New York (Met.)	3.84	3.76	3.76	3.76	3.75	5.56	3.38	4.40	4.05	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.75	4.25	3.55	3.55	5.25	3.35	4.05	4.00	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.05	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.62	3.62	3.62	3.40	5.25	3.05	4.30	4.00	3.22	3.75	8.40	6.75
Pittsburgh	3.35	3.40	3.40	3.40	3.40	5.00	3.15	....	4.45	....	3.65	8.15	6.75
Cleveland	3.25	3.30	3.30	3.40	3.58	5.18	3.15	4.05	4.42	3.20	3.75	8.40	6.75
Detroit	3.43	3.23	3.48	3.60	3.65	5.27	3.23	4.30	4.64	3.20	3.80	8.70	7.05
Omaha	3.90	3.80	3.80	3.95	3.95	5.55	3.45	..	5.00	..	4.42	..	....
Cincinnati	3.60	3.47	3.47	3.65	3.68	5.28	3.22	4.00	4.67	3.47	4.00	8.50	7.10
Chicago	3.50	3.40	3.40	3.55	3.55	5.15	3.05	4.10	4.60	3.30	3.75	8.15	6.75
Twin Cities	3.75	3.65	3.65	3.80	3.80	5.40	3.30	4.35	4.75	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.18	4.23	4.73	3.54	3.88	8.38	6.98
St. Louis	3.62	3.52	3.52	3.47	3.47	5.07	3.18	4.12	4.87	3.41	4.02	8.52	7.12
Kansas City	4.05	4.15	4.15	4.00	4.00	5.60	3.90	....	5.00	....	4.30	....	....
Indianapolis	3.60	3.55	3.55	3.70	3.70	5.30	3.25	....	4.76	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Chattanooga	3.80	4.00	4.00	3.85	3.85	5.68	3.70	....	4.40	....	4.39	....	....
Tulsa, Okla.	4.44	4.34	4.34	4.33	4.33	5.93	3.99	....	5.71	....	4.69	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.88	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	4.80	5.00	4.60	....	....
Houston, Tex.	4.05	6.20	6.20	4.05	4.05	5.75	4.20	....	5.25	.. .	....	....	....
Seattle	4.00	3.85	5.20	3.65	3.75	5.75	3.70	6.50	5.00	....	5.75	....	....
Portland, Oreg.	4.25	4.50	6.10	4.00	4.00	5.75	3.95	6.50	4.75	....	5.75	....	....
Los Angeles	4.15	4.60	6.45	4.00	4.00	6.40	4.30	6.50	5.25	....	6.60	10.55	9.80
San Francisco	3.50	4.00	6.00	3.35	3.35	5.60	3.40	6.40	5.15	....	6.80	10.65	9.80

	S.A.E. Hot-rolled Bars (Unannealed): 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.18	7.50	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.31	5.86	5.61	8.56
Baltimore	4.45	..	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.10	5.65	5.40	7.50
Pittsburgh	3.40	7.20	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.44	5.99	5.74	7.84
Chicago	3.70	7.10	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.82	7.47	6.02	5.77	7.87
Seattle	5.85	..	8.00	7.85	8.65
Portland, Oreg.	5.70	8.85	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	9.05
San Francisco	5.00	9.65	8.80	8.65	9.30

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland, Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in Birmingham.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Kansas City and St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 300-4999 in San Francisco, Portland; any quantity in Twin Cities; 300-1999 in Los Angeles.

Galvanized Sheets: Base, 1500-3499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle, San Francisco; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 1500 and over in Chattanooga: any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia.

Cold Rolled Strip: No base quantity; extras apply on lots of all size

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

CURRENT IRON AND STEEL PRICES OF EUROPE

Dollars at Official Rates of Exchange

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	British gross tons U. K. ports £ s d	Continental North Sea ports gross tons‡‡: Quoted in dollars at current value	Continental Channel or North Sea ports gross tons‡‡: **Quoted in gold pounds sterling £ s d
Foundry, 2.50-3.00 Si.	....	$33.23	3 18 0
Basic bessemer	....	.....	.. ..
Hematite, Phos. .03-.05	....	.....	.....
Billets	....	$31.95	3 15 0
Wire rods, No. 5 gage	....	60.71	7 2 6
Standard rails	....	$48.99	5 15 0
Merchant bars	2.66c 14 15 0	2.77c	7 6 0
Structural shapes	2.48c 13 15 0	2.83c	7 9 0
Plates, †¼ in. or 5 mm.	2.68c 14 17 6	3.53c	9 6 0
Sheets, black, 24 gage or 0.5 mm	3.40c 18 17 6	2.98c	7 17 0[c]
Sheets, gal., 24 ga., corr.	3.98c 22 2 6	3.94c	10 7 6
Bands and strips	....	2.76c	7 5 0
Plain wire, base	....	3.15c	8 6 3
Galvanized wire, base	....	3.75c	9 17 6
Wire nails, base	....	3.56c	9 7 6
Tin plate, box 108 lbs.	$ 5.61 1 7 9	.....	.....

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices at Works or Furnace—

Last Reported

	£ s d			French ‡‡France		Belgian ‡‡France		Reich ‡‡Mar
Fdy. pig iron, Si. ..5	$24.24	6	0 0(a)	$17.18	788	$31.44	950	$25.33	63
Basic bess. pig iron	22.83	5	13 0(a)	.....	...	29.79	900	27.94	(b) 69.50
Furnace coke	6.77	1	13 5	4.91	225	10.92	320	7.64	19
Billets	42.42	10	10 0	26.62	1,221	42.20	1,275	38.79	96
Standard rails	2.30c	12	15 6	1.69c	1,692	2.06c	1,375	2.38c	132
Merchant bars	2.78c	15	8 6††	1.53c	1,530	2.06c	1,375	1.98c	110
Structural shapes	2.46c	13	13 0††	1.49c	1,487	2.06c	1,375	1.93c	107
Plates, †¼-in. or 5 mm.	2.55c	14	3 0†;	1.95c	1,951	2.42c	1,610	2.29c	127
Sheets, black	3.49c	19	17 6§	2.30c	2,295‡	2.85c	1,900‡	2.59c	144‡
Sheets, galv., corr., 24 ga. or 0.5 mm.	4.07c	22	12 6	3.59c	3,589	4.80c	3,200	6.66c	370
Plain wire	3.83c	21	5 0	2.34c	2,340	3.00c	2,000	3.11c	173
Bands and strips	2.91c	16	3 6††	1.71c	1,713	2.48c	1,650	2.29c	127

†British ship-plates. Continental, bridge plates. §24 ga. ‡1 to 3 mm. basic price.

British quotations are for basic open-hearth steel. Continent usually for basic-bessemer steel.

(a) del. Middlesbrough. 5s rebate to approved customers. (b) hematite. °Close annealed.

††Rebate of 15s on certain conditions.

**Gold pound sterling not quoted. ‡‡No quotations.

IRON AND STEEL SCRAP PRICES

Corrected to Friday night. Gross tons delivered to consumers, except where otherwise stated; †indicates brokers prices

HEAVY MELTING STEEL

Birmingham, No. 1.	18.00
Bos. dock No. 1 exp.	17.00-17.50
New Eng. del. No. 1	17.00-17.50
Buffalo, No. 1	20.00-20.50
Buffalo, No. 2	18.00-18.50
Chicago, No. 1	19.50-20.00
Chicago, auto, no alloy	18.50-19.00
Cincinnati, dealers	16.75-17.25
Cleveland, No. 1	20.50-21.00
Cleveland, No. 2	19.50-20.00
Detroit, No. 1	†16.50-17.00
Detroit, No. 2	†15.50-16.00
Eastern Pa., No. 1	20.50-21.00
Eastern Pa., No. 2	19.50-20.00
Federal, Ill., No. 2	16.50-17.00
Granite City, R. R. No. 1	17.25-17.50
Granite City, No. 2	16.00-16.50
Los Ang., No. 1 net	13.00-13.50
Los Ang., No. 2 net	12.00-12.50
N. Y. dock No. 1 exp.	†17.00
Pitts., No. 1 (R. R.)	23.00-23.50
Pittsburgh, No. 1	21.00-22.00
Pittsburgh, No. 2	19.50-20.00
St. Louis, No. 1	17.50-18.00
St. Louis, No. 2	16.50-17.00
San Fran., No. 1 net	13.00-13.50
San Fran., No. 2 net	12.00-12.50
Seattle, No. 1	15.00
Toronto, dirs., No. 1	11.00-11.25
Valleys, No. 1	21.00-21.50

COMPRESSED SHEETS

Buffalo, hydraulic compressed sheets	18.00-18.50
Chicago, factory	19.00-19.50
Chicago, dealers	17.50-18.00
Cincinnati, dealers	15.75-16.25
Cleveland	20.00-20.50
Detroit	†18.25-18.75
E. Pa., new mat.	21.00
E. Pa., old mat.	17.50-18.00
Los Angeles, net	9.50-10.00
Pittsburgh	21.00-22.00
St. Louis	14.00-14.50
San Francisco, net	9.50-10.00
Valleys	19.50-20.00

BUNDLED SHEETS

Buffalo, No. 1	18.00-18.50
Buffalo, No. 2	16.50-17.00
Cleveland	15.00-15.50
Pittsburgh	19.50-20.00
St. Louis	13.00-13.50
Toronto, dealers	9.75

SHEET CLIPPINGS, LOOSE

Chicago	14.00-14.50
Cincinnati, dealers	11.25-11.75
Detroit	†14.75-15.25
St. Louis	12.00-12.50
Toronto, dealers	9.00

BUSHELING

Birmingham, No. 1.	14.50
Buffalo, No. 1	18.00-18.50
Chicago, No. 1	18.50-19.00
Cincin., No. 1 deal.	12.75-13.25
Cincin., No. 2 deal.	7.00- 7.50
Cleveland, No. 2	14.00-14.50
Detroit, No. 1 new	†17.50-18.00
Valleys, new, No. 1	19.50-20.00
Toronto, dealers	5.50- 6.00

MACHINE TURNINGS (Long)

Birmingham	7.50
Buffalo	13.50-14.00
Chicago	13.75-14.25
Cincinnati, dealers	9.50-10.00
Cleveland, no alloy	13.50-14.00
Detroit	†10.00-10.50
Eastern Pa.	14.50-15.00
Los Angeles	4.00- 5.00
New York	†9.00- 9.50
Pittsburgh	15.50-16.00
St. Louis	10.50-11.00
San Francisco	5.00
Toronto, dealers	7.25- 7.50
Valleys	14.00-14.50

SHOVELING TURNINGS

Buffalo	14.50-15.00
Cleveland	14.00-14.50
Chicago	14.00-14.50
Chicago, spcl, anal.	15.00-15.50
Detroit	†12.25-12.50
Pitts., alloy-free	17.00-17.50

BORINGS AND TURNINGS
For Blast Furnace Use

Boston district	†7.25- 7.50
Buffalo	13.00-13.50
Cincinnati, dealers	7.75- 8.25
Cleveland	14.00-14.50
Eastern Pa.	13.00-13.50
Detroit	†12.00-12.50
New York	†8.75- 9.00
Pittsburgh	14.00-14.50
Toronto, dealers	7.00- 7.25

AXLE TURNINGS

Buffalo	16.50-17.00
Boston district	†12.00-12.50
Chicago, elec. fur.	19.00-19.50
East. Pa. elec. fur.	19.50-20.00
St. Louis	23.25-23.75
Toronto	7.25- 7.50

CAST IRON BORINGS

Birmingham	8.50
Boston dist. chem.	†9.50- 9.75
Buffalo	13.00-13.50
Chicago	13.50-14.00
Cincinnati, dealers	7.75- 8.25
Cleveland	14.00-14.50
Detroit	†12.00-12.50
E. Pa., chemical	14.50-15.00
New York	†8.75- 9.00
St. Louis	10.00-10.50
Toronto, dealers	7.25- 7.50

RAILROAD SPECIALTIES

Chicago	23.00-23.50

ANGLE BARS—STEEL

Chicago	22.00-22.50
St. Louis	20.50-21.00

SPRINGS

Buffalo	24.50-25.00
Chicago, coil	24.00-24.50
Chicago, leaf	23.00-23.50
Eastern Pa.	25.00-26.00
Pittsburgh	28.00-28.50
St. Louis	22.50-23.00

STEEL RAILS, SHORT

Birmingham	19.50
Buffalo	24.00-24.50
Chicago (3 ft.)	22.75-23.25
Chicago (2 ft.)	23.50-24.00
Cincinnati, dealers	23.50-24.00
Detroit	†23.00-23.50
Pitts., 2 ft. and less	27.00-27.50
St. L. 2 ft. & less	23.75-24.25

STEEL RAILS, SCRAP

Birmingham	17.00
Boston district	†14.50-15.00
Buffalo	22.00-22.50
Chicago	20.50-21.00
Cleveland	24.00-24.50
Pittsburgh	24.00-24.50
St. Louis	20.75-21.25
Seattle	18.00-18.50

PIPE AND FLUES

Chicago, net	13.00-13.50
Cincinnati, dealers	12.50-13.00

RAILROAD GRATE BARS

Buffalo	14.00-14.50
Chicago, net	14.00-14.50
Cincinnati, dealers	12.00-12.50
Eastern Pa.	18.00
New York	†12.00-12.50
St. Louis	14.00-14.50

RAILROAD WROUGHT

Birmingham	16.00
Boston district	†9.50-10.00
Eastern Pa., No. 1	20.00-20.50
St. Louis, No. 1	21.00-21.50
St. Louis, No. 2	17.00-17.50

FORGE FLASHINGS

Boston district	†12.00-12.25
Buffalo	18.00-18.50
Cleveland	19.00-19.50
Detroit	†16.50-17.00
Pittsburgh	19.50-20.00

FORGE SCRAP

Boston district	†7.00
Chicago, heavy	23.25-23.75

LOW PHOSPHORUS

Cleveland, crops	23.50-24.00
Eastern Pa., crops	25.00-25.50
Pitts., billet, bloom. slab crops	28.00-28.50

LOW PHOS. PUNCHINGS

Buffalo	24.00-24.50
Chicago	22.75-23.25
Cleveland	21.50-22.00
Eastern Pa.	25.00-25.50
Pittsburgh	26.50-27.00
Seattle	15.00
Detroit	†20.00-20.50

RAILS FOR ROLLING
5 feet and over

Birmingham	20.00
Boston	†15.75-16.00
Chicago	24.00-24.50
New York	†18.00-18.50
Eastern Pa.	25.00-26.00
St. Louis	23.50-24.00

STEEL CAR AXLES

Birmingham	18.00
Boston district	†18.50-19.00
Chicago, net	24.00-24.50
Eastern Pa.	25.00-25.50
St. Louis	24.00-24.50

LOCOMOTIVE TIRES

Chicago (cut)	22.50-23.00
St. Louis, No. 1	19.25-19.75

SHAFTING

Boston district	†19.00-19.25
New York	†19.00-19.50
Eastern Pa.	25.00-25.50
St. Louis, 1¼-3¾"	19.75-20.25

CAR WHEELS

Birmingham, iron	15.00
Boston dist., iron	†15.25-15.50
Buffalo, steel	24.50-25.00
Chicago, iron	20.00-20.50
Chicago, rolled steel	23.50-24.00
Cincin., iron deal.	20.00-20.50
Eastern Pa., iron	21.50-22.00
Eastern Pa., steel	25.50-26.00
Pittsburgh, iron	22.00-22.50
Pittsburgh, steel	28.00-28.50
St. Louis, iron	20.00-20.50
St. Louis, steel	22.50-23.00

NO. 1 CAST SCRAP

Birmingham	17.00
Boston, No. 1 mach.	†16.50-16.75
N. Eng. del. No. 2	15.25-15.75
N. Eng. del. textile	19.50-20.00
Buffalo, cupola	18.50-19.00
Buffalo, mach.	20.00-20.50
Chicago, agri. net	15.50-16.00
Chicago, auto net	18.25-18.75
Chicago, railr'd net	17.00-17.50
Chicago, mach. net	17.00-17.50
Cincin., mach. deal.	20.50-21.00
Cleveland, mach.	21.75-22.25
Detroit, cupola, net	†17.00-17.50
Eastern Pa., cupola	22.00-22.50
E. Pa., No. 2 yard	18.50-19.00
E. Pa., yard fdry	19.00-19.50
Los Angeles	16.50-17.00
Pittsburgh, cupola	20.50-21.00
San Francisco	14.50-15.00
Seattle	14.50-16.00
St. L., agri. mach.	19.25-19.75
St. L., No. 1 mach.	19.75-20.25
Toronto, No. 1 mach., net dealers	18.00-18.50

HEAVY CAST

Boston dist. break.	†15.25-15.50
New England, del.	16.25-16.75
Buffalo, break	17.50-18.00
Cleveland, break, net	16.50-17.00
Detroit, auto net	†17.25-17.75
Detroit, break.	†15.00-15.50
Eastern Pa.	21.00
Los Ang., auto, net.	13.00-14.00
New York break	†16.00-16.50

STOVE PLATE

Birmingham	10.00-11.00
Boston district	†11.50-11.75
Buffalo	17.00-17.50
Chicago, net	13.00-13.50
Cincinnati, dealers.	12.50-13.00
Detroit, net	†12.00-12.50
Eastern Pa.	17.50
New York fdry	†13.00
St. Louis	†13.50-14.00
Toronto dealers, net	12.00

MALLEABLE

New England, del.	22.00-23.00
Buffalo	22.50-23.00
Chicago, R. R.	23.00-23.50
Cincin. agri., deal.	17.75-18.25
Cleveland, rail	22.50-23.00
Eastern Pa., R. R.	22.50-23.00
Los Angeles	12.50
Pittsburgh, rail	25.00-25.50
St. Louis, R. R.	20.00-20.50

Ores

Lake Superior Iron Ore

Gross ton, 51½ % Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	10.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos	nom.
Spanish, No. African basic, 50 to 60%	nom.
Chinese wolframite, net ton, duty pd.	$23.50-24.00
Brazil iron ore, 68-69%, ord.	7.50c
Low phos. (.02 max.)	8.00c
F.O.B. Rio Janeiro.	
Scheelite, imp.	$25.00
Chrome ore, Indian, 48% gross ton, cif.	$28.00-30.00

Manganese Ore

Including war risk but not duty, cents per unit cargo lots.

Caucasian, 50-52%	
So. African, 50-52%	54.00-55.00
Indian, 49-50%	54.00
Brazilian, 46%	50.00
Cuban, 50-51%, duty free	67.50

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

Sheets, Strip

Sheet & Strip Prices, Pages 246, 247

Pittsburgh — No change has occurred in automotive releases or miscellaneous buying. Operations are up slightly, with sheets between 75 and 80 per cent of capacity. Galvanized sheet production is up 1 point to 78 per cent, which is within one point of the highest rate of the past ten years, set last fall.

Cleveland—Demand is not as brisk as in other steel items, partly because consumers covered during the period of bargain prices and have built up large stocks. On current buying sheet deliveries are among the promptest on the list, usually three to five weeks. Apparently extension of the deadline for delivery of bargain sheets from Sept. 30 to the end of the year was only an isolated instance. Some producers, however, have carried over into October from the Sept. 30 deadline. Automobile stamping concerns are extremely busy, but barrel makers are only mildly engaged. It is learned here that the government has ordered 50,000 barrels at St. Louis, there being talk of national purchases totaling 1,000,000. For many mills sheet orders are in line with operations. Deliveries on hot-rolled sheets are more extended than on full-finished.

Chicago—With automotive interests still not buying steel against 1941 model runs, the situation in sheets and strip is easier than for other rolled products. Orders from automobile partsmakers and the general run of consumers are steady and mills are just about able to keep backlogs from getting out of hand. Deliveries can be had in three to four weeks.

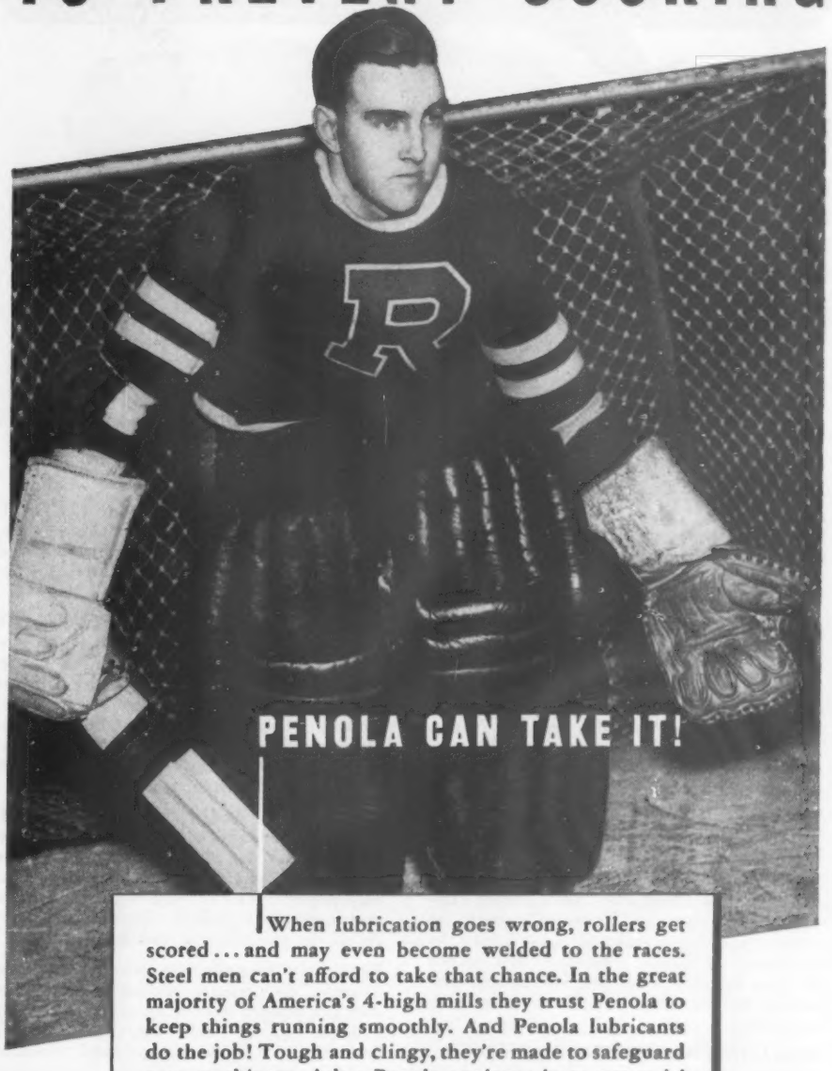
Boston—More new buying than expected has developed for sheets, in view of heavy purchases at cut prices, most of which was delivered by late September. Such orders are generally firm at 2.10c base for hot-rolled. While inventories held by numerous consumers and distributors are still substantial, bargain tonnage is being worked off at a higher rate than predicted and more new spot orders for prompt delivery, notably galvanized for construction needs, are being placed. Increasing consumption of narrow cold strip by additional industrial fabricators is being reflected in buying, although part of incoming tonnage is apparently for inventory, especially with the automotive and accessory trade.

New York—Sheet deliveries are being pushed steadily back, with most leading sellers now able to do little under five weeks on hot and cold sheets. Instead of any letup as a result of the heavy movement last month, the situation is becoming tighter as demands develop. Manufacturers of consumer goods are taking more sheets in many instances, and there is a growing accumulation for defense work of one type or another.

Improvement in narrow cold strip buying has brought volume beyond capacity. Some backlogs have increased 50 per cent in a fortnight. Considerable pending business has been closed. Consumers are seeking more advanced coverage. More orders are being taken for first quarter shipment at open prices and deliveries on additional items, notably specialties, are becoming more extended, fearing priorities and possible shortage or delay in deliveries.

Philadelphia — Sheet orders are heavier, reflecting increased consumption and attempts of some consumers to anticipate future needs in the face of gradual extension of mill deliveries. Producers are able to work in occasional small tonnages for relatively early shipment but four to five weeks usually is required on hot-rolled. Stainless deliveries are delayed as much as eight weeks. Army field ranges on which bids will open

TO PREVENT SCORING



When lubrication goes wrong, rollers get scored... and may even become welded to the races. Steel men can't afford to take that chance. In the great majority of America's 4-high mills they trust Penola to keep things running smoothly. And Penola lubricants do the job! Tough and clingy, they're made to safeguard *your* machinery. Ask a Penola engineer in to prove it!

PENOLA LUBRICANTS

Penola Inc., Pittsburgh, Pa. (Formerly Pennsylvania Lubricating Co.)

New York • Chicago • Detroit • St. Louis

LUBRICANTS FOR THE STEEL INDUSTRY SINCE 1885

soon will require 200 tons of stainless sheets.

Buffalo—Delivery dates are not being promised on sheet and strip orders. Mill backlogs continue to expand in face of active rolling schedules. Preference is being shown to fourth quarter bookings of regular customers. The national defense drive is reflected in an increased number of new buyers from diversified manufacturing sources. Motor specifications continue heavy.

Cincinnati — Sheet mills are pushing production as backlogs become more extended and delivery lags. Specifications tend upward; automotive tonnage is holding and other needs are growing in reflection of national defense. A few inquiries on delivery positions for first quarter are taken to indicate anxiety over growing requirements.

St. Louis—Sheet and strip demand continues the steady expansion of recent weeks, with demands well diversified, both as to grades and users. Improvement is noted in galvanized sheets, which are moving in larger volume to the rural areas. Bins for storing grain requiring 8000 tons of galvanized sheets have been awarded, 5500 tons Butler Manufacturing Co., and 2500 tons to Columbian Steel Tank Co., both of Kansas City, Mo.

Birmingham, Ala. — Miscellaneous buying of sheets is somewhat improved, with the result that delivery dates are being somewhat further extended in virtually all items of sheets, while strip remains only fairly active.

Toronto, Ont.—Demand for sheets and strip continues heavy, producers accepting orders for delivery early in 1941, while consumers in urgent need of supplies are ordering chiefly from the United States. Warehouse operators also are furnishing some supplies to smaller users, and in turn are placing large tonnage orders with mills for future stocks. Heavy buying by the automotive industry and electric equipment makers features the market.

MODEL "16" . . . HAS MANY MONEY SAVING FEATURES

. . and many more!

WHEN YOU BUY PEASE QUALITY YOU ACTUALLY PAY LESS

MODEL "16", the newest Pease Streamlined Blueprinting Machine, possesses many of the design and performance features of the higher priced, widely used PEASE MODEL "22".

MODEL "16" actually prints at 15 linear feet per minute top speed. This means that at *15 feet per minute*, Model "16" turns out really *usable prints*. The **four PEASE Intermediate Actinic Arc Lamps** in the 42" Model and five in the 54" Model burn for forty-five minutes to one hour without breaking the arc. These Lamps are so placed in relation to the contact glass that maximum use is made of the actinic rays and even coverage is assured.

SLIDING CONTACT, as used in all PEASE Machines, is the nearest approach to Vacuum Frame Contact, in accuracy of reproduction and safety to tracings. It cannot reproduce dirt marks or glass imperfections and it smooths out bulges before they can form damaging wrinkles.

HORIZONTAL WATER WASHING is another of the several features which make high production speed possible in the Model "16" as well as in all PEASE Continuous Machines. With this system, the paper floats without tension, hence, is completely conditioned in clear water yet develops no wrinkles.

THE QUICK CHANGE CHEMICAL APPLICATOR located between the washing and the drying stages makes possible the changeover from blueprinting to negative work or vice-versa, in thirty seconds. This system is very efficient and economical in its use of chemical, saving from 50 to 90 percent of the potash consumed by other machines.

FIVE 8" ALUMINUM DRYING DRUMS dry and calender the prints on Model "16" to an exceptional flatness, which many users have compared to hung wall paper. The drying is gradual, even, and easily controlled through a toggle switch at the front of the machine.

Not only does the fast printing speed of Model "16" assure an exceptional low cost per square foot of finished prints, but Model "16" is also extremely flexible and easy to operate. Its original purchase price is as attractive as its Streamlined appearance. ***Don't wait to investigate.***

DESCRIPTIVE LITERATURE NOW AVAILABLE

THE C. F. PEASE COMPANY

2688 West Irving Park Road . . . Chicago, Illinois

Plates

Plate Prices, Page 246

Pittsburgh—Backlogs continue to mount, inquiry fairly good, and placements active. Buyers are attempting to protect themselves, some as far as six months.

Cleveland—Demand continues lively and from many kinds of consumers. Plates in the lighter gages and on the smaller mills, such as for tank manufacture, can be delivered in three weeks, but the quality product in wide sizes usually requires four to six weeks. New extras announced last September are being adhered to strictly.

Chicago—Plate orders are in good volume, from a good diversification of consumers and fabricators. Railroad car repair requirements are substantial and tank and heavy construction shops are busy.

Boston — Shipyard specifications for plates are outstanding and distribution of orders among Eastern Pennsylvania mills is broadening as more work available to smaller yards is figured. Miscellaneous carlot purchases are heavier and some inquiry from Canada is noted. Boiler shops are working off material at a fair rate, but are buying little beyond immediate needs while structural fabricators are contributing little to the aggregate total.

New York—While light plates up to about 84 inches in width can still be had for fairly early delivery, the situation in the still wider sizes and in thicknesses of more than ¾-inch is increasingly tight. Some large mills can do little under eight weeks.

Plate demand in general is being further stimulated not only by shipbuilding in various defense projects, which are being reflected particularly in the building field, but by the sharp spurt in railroad requirements. Approximately 20,000 tons of plates, about half of which will be light armor plate, is being bought by American Car & Foundry Co., New York, against a recent army order for 3090 combat tanks.

Philadelphia—Plate backlogs are still expanding and some mills recently able to offer a week to ten days delivery on light plates now are asking three weeks. Five to six weeks is more commonly required on heavy material. Miscellaneous buying is heavier, for immediate needs. Railroad specifications are larger, with additional gains for car work indicated. Steady call for ship plates continues. Export business is relatively moderate.

Birmingham, Ala.—With specifications in for a large volume of plates, for car production and shipbuilding, mill backlogs are further accentuated. This, added to demand from tank manufacturers and from miscellaneous sources, is keeping production at capacity.

Seattle — Demand for plates is more active, with awards of additional shipbuilding contracts. General industrial improvement is noted. Puget Sound Machinery Depot, Seattle, is low for fabrication of 1600 feet of 51½-inch steel water pipe for Seattle water system, requiring 125 tons of plates.

San Francisco—No plate contracts of size were reported placed. It is expected that the United States maritime commission will shortly award two P-4-P type passenger vessels, calling for 16,800 tons of plates and 11,200 tons of shapes, with the Seattle-Tacoma Shipbuilding Corp., Tacoma, Wash. Bids open this week on 4900 tons for ten seaplane tenders for use on the west coast. The government will call for bids soon on three coast guard cutters, 327 feet long, at a cost of approximately $10,000,000.

Toronto, Ont. — Further strengthening in demand for plates is indicated by announcement from Ottawa that arrangements are under way for expanding the Canadian shipbuilding program, practically doubling the outlay on this account, which to date totals upwards of $40,000,000. New business in the plate market is going almost entirely to the United States and deliveries from across the lines are reported around 15,000 tons monthly.

Plate Contracts Placed

1030 tons, four 102-foot diameter tanks, Gulf Oil Corp., St. Joseph, Fla., to

Forged carbon steel sprocket shaft produced by Standard. Diameter 2' 11"; length 5' 11¼"; weight 5160 pounds.

Cast steel runner supplied by Standard Steel Works for an I.P. Morris Hydraulic Turbine.

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STEEL FORGING AND CASTING PROBLEMS

If your productive capacity calls for a dependable source of supply for steel forgings and castings of unusual design—try Standard.

Good steel, long experience and close control of every step in manufacture, from open-hearth to finished product, assure the satisfactory quality of Standard's forgings and castings.

Won't you discuss your requirements with us and let us advise you how Standard can help?

CASTINGS • FORGINGS • WELDLESS RINGS • WROUGHT STEEL WHEELS

STANDARD STEEL WORKS

Division of THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

THE BALDWIN GROUP

Graver Tank & Mfg. Co. Inc., East Chicago, Ind.

250 tons, tanks, Delaware, Lackawanna & Western, Jersey City, N. J., to Hammond Iron Works, Warren, Pa.

230 tons, six cylinders, Wyatt Metal & Boiler Works, Houston, Tex., to A. O. Smith Corp., Milwaukee.

150 tons, discharge pipe, Quonset Point, R. I., to Lancaster Iron Works Inc., Lancaster, Pa.

100 tons or more, ammunition cars for Puget Sound navy yard; Pacific Car & Foundry Co., Seattle, general contractor.

100 tons or more, steel covered lighter for navy department; Birchfield Boiler Co., Tacoma, general contractor.

Plate Contracts Pending

125 tons, 51½-inch steel water line, Seattle; Puget Sound Machinery depot, Seattle, low.

Bars

Bar Prices, Page 246

Pittsburgh—Because of the heavy volume of new inquiries, bar mill operators are doing their utmost to clear up schedules as far as possible and prepare for the rush which is considered almost certain before the end of the year. Currently deliveries are being made on schedule and specifications are in fairly good volume. Prices are steady.

Cleveland—Being a heavy bar consuming district the tensely booked-up condition locally is one of the features of the general steel situation. Producers now cannot promise deliveries short of Dec. 1 and in another fortnight it is expected that this date will have been advanced to Dec. 31. The situation in alloy bars is as critical as in soft carbon, Moreover, it is said that potential orders for the first phases of the defense program are still on drawing boards, with an avalanche of orders when these are released. Purchasing by the automotive industry is comparatively quiet.

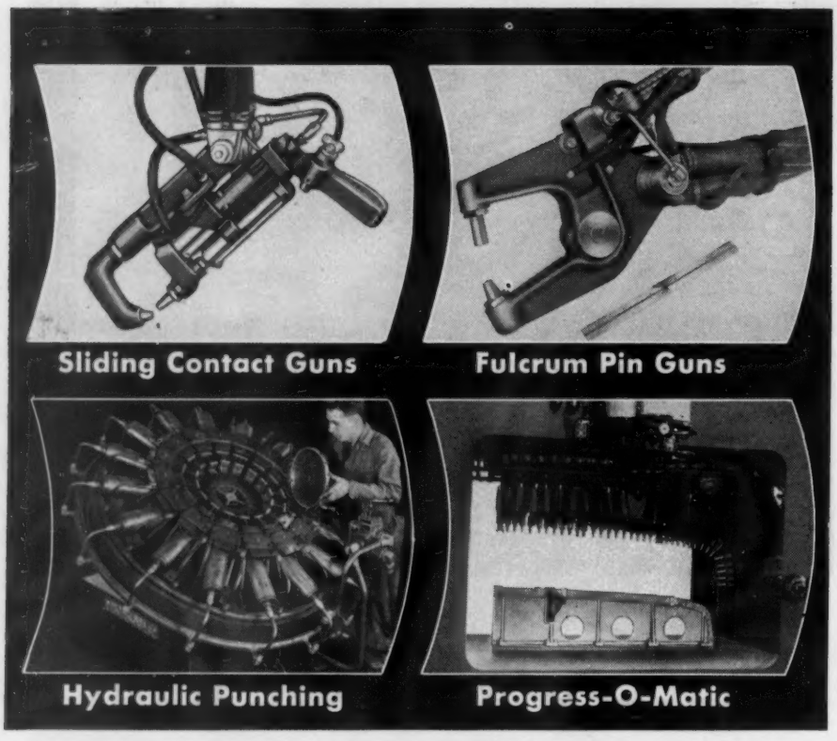
Chicago—Steel bars and billets are the most active of all products here, with mills in a particularly tight spot on alloy grades and certain carbon grades. Orders are running well ahead of deliveries and substantial backlogs are accumulating. Generally, deliveries range from four to six weeks. In connection with national defense orders from fabricators, the rigid metallurgical specifications established by the government is causing confusion and delay.

Boston—Additional advance covering is being done by consumers of carbon steel and alloy bars, notably the latter. Fourth quarter releases against contracts are brisk and higher consumption is resulting in unexpected orders from users generally considered well protected, including forgers and small tool makers. More tonnage for defense products is appearing with indications buying in the near future for rifle barrels and small arms will be heavier.

Philadelphia—Merchant bar demand continues to receive strong support from various types of defense work although buying lately has been more diversified. Mills are falling behind gradually on deliveries, with some specialties not available until next quarter. Considerable interest is shown in plans of Bendix Aviation Corp. for the manufacture of aircraft parts in the recently idle plant of A. Atwater Kent Mfg. Co., here, just acquired.

Birmingham, Ala.—Bars are moving in good volume, particularly for concrete reinforcing, although there has been considerable increase in movement of merchant bars. Deliveries are beginning to slow up somewhat, and considerable backlogs are in evidence.

Buffalo—Defense needs are more pronounced in current bar output as orders from some other sources



SPEED UP Sheet Metal Assembly
with these *New* Developments

Manufacturers who thought they employed the fastest methods for handling big multi-spot assemblies have had to revise their ideas of speed—upwards. Developments such as Progressive's Hydr-O-Matic, Progress-O-Matic, and Electr-O-Matic, together with Progressive's Hydraulic Punching Equipment, have given their programs a tremendous impetus.

Manufacturers of smaller assemblies who thought that "production welding and punching is not for us" have suddenly found themselves moved up into the mass production class with low cost portable gun welder units and individual unit punching equipment.

All have saved money. All have turned out a better product and have made more profit.

Some of Progressive's recently developed equipment which they have used is shown here. More of it together with the revolutionary Resistance Forge-Welding which welds heavier work than ever welded before will be on display at the METAL EXPOSITION in Cleveland.

Find out what it will do for you!

Information concerning your problem and the best means of doing it better, cheaper and for a bigger profit is yours for the asking.

Ask Progressive how it can be done.

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have shown tendency to level off. Consumers continue to press for deliveries which are still extended four to six weeks.

Toronto, Ont. — Merchant bar sales are heavier, with sharp increase in forward delivery booking reported for the past week. Manufacturing interests are ordering more freely both for immediate needs and for delivery to the end of the year.

Pipe

Pipe Prices, Page 247

Pittsburgh—Oil country business is steady at the same rate as last week. Little activity is reported in line pipe. Standard pipe demand holds steady. Shipments from consigned stocks continue in good volume. Prices are firm both in the mill and secondary market. Mechanical goods releases from automotive and aircraft sources also are heavy.

Cleveland—In cold-drawn boiler tubes principal makers are turning down as much business as they are booking, with mills at full capacity. Hot-rolled boiler tubes are not in such heavy demand nor tight situation but are active. Mechanical tubing, such as for bicycle frames, is in good demand and for a wide variety of purposes, entering into armament manufacture to considerable extent. Producers of merchant pipe are falling farther behind schedules in shipments to jobbers and manufacturing consumers.

Boston—While there are indications that merchant steel pipe resale prices are steadier in some districts, quotations continue weak and mixed, although mills are firmer. Demand is heavier, partly seasonal, but more notably for cantonment and defense needs. Improvement in cast pipe buying and releases has increased operations at the Everett, Mass., foundry to five days a week. Releases against blanket contracts are more active, and, while utilities are buying conservatively, the Salem, Mass., gas company has released 2000 feet of 4-inch.

Birmingham, Ala.—A substantial volume of cast iron pipe tonnage is being booked, with considerable coming from government sources, mostly airfields. West Coast customers continue to take substantial tonnage and production remains on a five-day basis.

Seattle—Bids are in for unstated tonnages at Fort Lewis and Tacoma, Wash., and Seattle has several projects up for figures in the immediate future. Inquiry is increasing and the market generally is improved.

San Francisco—Bids have been

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opened on the second largest cast iron pipe inquiry of the year, 2500 tons of 6 to 12-inch pipe for Los Angeles. No other projects of 100 tons or more are pending. Awards aggregated 879 tons and brought the total to date to 34,080 tons, compared with 28,898 tons for the corresponding period in 1939. Stocks on the Pacific Coast are extremely low and demand for small lots continues heavy.

Toronto, Ont. — Heavy demand for pipe has developed in recent months, with government war construction projects calling for heavy tonnages.

Cast Pipe Placed

1500 tons, 4 to 12-inch, Camp Edwards, Falmouth, Mass., to Warren Pipe Co., Everett, Mass.

500 tons, 6 to 12-inch, class 150, metropolitan district commission, Hartford, Conn., to United States Pipe & Foundry Co., Burlington, N. J.

356 tons, 18-inch Class 250 and 24-inch Class 150, Santa Monica, Calif., to United States Pipe & Foundry Co., Burlington, N. J.

150 tons, various sizes, Vallejo, Calif., divided between Pacific States Cast Iron Pipe Co., Provo, Utah, and United States Pipe & Foundry Co., Burlington, N. J.

Steel Pipe Placed

250 tons, 6-inch and under, naval air base, Quonset Point, R. I., to Jones & Laughlin Steel Corp., Pittsburgh.

Rails, Cars

Track Material Prices, Page 247

With inquiries out for more than 10,000 freight cars this past week and with heavy additional programs under contemplation, sellers of railroad steel anticipate an active fall business. Whether there will be quite the activity which marked the closing four months of last year, when more than 45,000 cars were placed, remains to be seen, but some trade leaders regard it as easily possible.

In addition to new inquiries a large number is said to be under contemplation by the Pennsylvania railroad, with as many as 28,000 being mentioned in trade circles. Norfolk & Western, a substantial buyer over recent months, contemplates the purchase of 3000 box cars, with inquiries likely to be issued shortly.

Rail Orders Placed

New York Central, 71,000 tons, to Carnegie-Illinois Steel Corp., Pittsburgh, Bethlehem Steel Co., Bethlehem, Pa., Inland Steel Co., Chicago, and Algoma Steel Corp., Ltd., Sault Ste. Marie, Ontario, Canada; accessories have been divided among more than a score of companies.

Southern Railroad, 30,000 tons, to Tennessee Coal, Iron & Railroad Co., Birmingham, Ala.

Car Orders Placed

Atlantic Coast Line, 128 auto-box cars to Pullman Standard Car Mfg. Co., Chicago; these are in addition to 600 cars of this type placed with this builder recently; 125 logging cars, recently placed with the Greenville Steel Car Co., Greenville, Pa., have been cancelled to permit the purchase of the additional auto-box cars.

Chicago, Indianapolis & Louisville, 20 fifty-ton ballast cars to the American Car & Foundry Co., New York.

Wheeling & Lake Erie, 500 fifty-ton box cars, 300 going to Pullman Standard Car Mfg. Co., Chicago, and 200 to American Car & Foundry Co., New York.

Car Orders Pending

Detroit, Toledo & Ironton, 300 gondolas of either 50 or 70 tons capacity, bids asked.

Erie, 1200 cars, including 500 fifty-ton hoppers; 300 fifty-ton box; 250 seventy-ton drop-end gondolas; 100 fifty-ton furniture cars; 50 seventy-ton flat cars.

Great Northern, 2000 freight cars, reported pending.

Lehigh Valley, 750 freight cars, comprising box cars and gondolas, pending.

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Norfolk & Western, 3000 box cars, contemplated.

Northern Pacific, 500 to 2000 box cars, bids asked.

Pacific Fruit Express, 1000 refrigerator cars, bids asked.

Santa Fe, 2800, including 2000 box cars, 200 fifty-ton mill gondolas, 200 hopper bottom gondolas, 50 seventy-ton low side mill gondolas and 50 flat cars; bids asked.

Rail Orders Pending

Wheeling & Lake Erie, 2000 tons; bids asked.

Locomotives Placed

Wheeling & Lake Erie, seven Berkshire locomotives, to American Locomotive Co., New York.

Buses Booked

A.C.F. Motors Co., New York: Forty-five 36-passenger for Philadelphia Transportation Co., Philadelphia; Twenty-four 29-passenger for Southeastern Greyhound Lines, Lexington, Ky.; six 28-passenger for Valley Transportation Co., Lemoyne, Pa.; five 29-passenger for Bowen Motor Coaches, Fort Worth, Tex.; five 29-passenger for Virginia Stage Lines, Charlottesville, Va.; two 29-passenger for Sunshine Bus Lines Inc., Dallas, Tex.

Wire

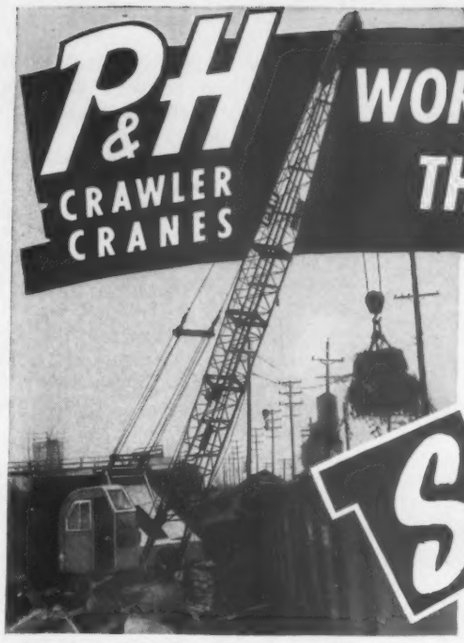
Wire Prices, Page 247

Pittsburgh — Manufacturers' wire items are moving fairly well. Merchant items are active, particularly nails and other construction material. Some defense orders are now being received, principally for further processing. Deliveries are in fairly good shape.

Chicago—Demand for wire and wire products continue active. Shipments are running behind orders. Orders for nails and staples are in good volume.

Boston—Broadening demand for wire, involving more products, notably specialties, maintains incoming volume, with mill backlogs mounting moderately. Forward buying is gaining momentum, and higher production schedules are spreading to additional finishing departments, several being near capacity. Except for longer-processed specialties, deliveries are not much beyond normal, but inasmuch as considerable volume of tonnage produced in this district comes under the specialty group, shipments on a substantial part of unshipped orders are lengthening. While consumption of wire in manufacturing industries is increasing, part of diversified tonnage now coming in is for inventory.

New York—Consumers are covering more in advance and current buying is heavy, with more volume being booked at open prices for first quarter delivery. Aggregate bookings exceed capacity. Much



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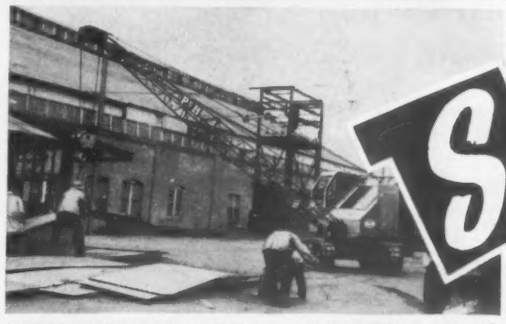

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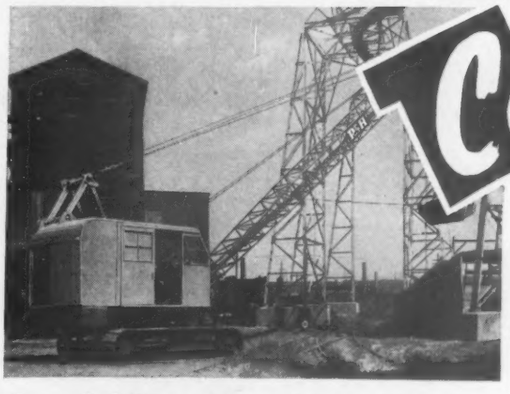

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demand is due to heavier consumption.

Birmingham, Ala. — Specifications for wire continue substantial. Output of wire products is approximately 85 per cent of capacity.

Shapes

Structural Shape Prices, Page 246

Pittsburgh—Awards are again heavy after a fairly light week. Inquiries also are active, and backlogs continue to increase, complicating the already bad delivery situation. Little relief is seen for shape mills in the near future.

Cleveland — The largest live project is a plant building for Westinghouse Electric & Mfg. Co. on the West Side, rumored awarded to a local designer and fabricator. Many comparatively small jobs are on inquiry.

Chicago—A quiet situation prevails for structural shapes, with fabricators figuring on little in this immediate vicinity. Few orders were taken the past week and inquiries are light. Most demand is for highway bridges in western states. Orders and inquiries for steel piling continue good.

Boston — Accumulation of small-lot miscellaneous orders has built up heavier backlogs with the smaller district fabricating shops, while slower mill deliveries, seven to eight weeks, is turning more structural tonnage to warehouses. Aggregate tonnage involved in current lettings is lower, including close to 1500 tons for additional work. Quonset Point, R. I., where several more hangars will be estimated, is taking better than 5000 tons.

Philadelphia—No relief is seen this quarter in the tight delivery condition as mills attempt to expedite defense work by giving preference to orders identified with rearmament. So far, no serious delays to such construction has been encountered. A large tonnage is expected to be required for rehabilitating the Cramp shipbuilding yard and also for work for the New York Shipbuilding Co., which has a federal allocation of $10,500,000 for shipways, tools and buildings.

Buffalo—Mills are extending shape deliveries five to seven weeks and fabricators report backlogs heavy but many projects are still to be awarded. Bethlehem Steel received the 2000-ton award for the new plant of the Bell Aircraft Corporation at Niagara Falls, N. Y.

Seattle—Fabricating shops have heavy backlogs and additional projects involving large tonnages are out for bids. The outlook is the most promising in three years.

Birmingham, Ala.—Shapes are moving in large volume. A large proportion is for bridge repair and considerable upturn is evident from private construction. Local fabricators are working near capacity.

Toronto, Ont. — Structural steel awards continue high, with fabricators operating close to capacity. Awards for the past week passed 10,000 tons with 20,000 tons pending. While much business can be traced

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Representatives and Warehouses in practically all principal cities.

Shape Awards Compared

	Tons
Week ended Oct. 12	36,034
Week ended Oct. 5	36,353
Week ended Sept. 28	91,266
This week, 1939	19,927
Weekly average, year, 1940	26,587
Weekly average, 1939	22,411
Weekly average, Sept.	66,171
Total to date, 1939	930,513
Total to date, 1940	1,090,061

Includes awards of 100 tons or more.

directly to the war program, private construction undertakings call for much tonnage.

Shape Contracts Placed

4000 tons, three C-2 type cargo vessels, United States maritime commission, to Moore Drydock Co., Oakland, Calif.

3000 tons, various manufacturing buildings, for International Harvester Co., Chicago, to Gage Structural Steel Co., Chicago.

2055 tons, hangars 1 and 2, Mobile, Ala., to Nashville Bridge Co., Nashville, Tenn.

2000 tons, building, Bell Aircraft Corp., Niagara Falls, N. Y., to Bethlehem Steel Co., Buffalo; Austin Co., Cleveland, general contractor.

1500 tons, addition for Otis-Fensom Elevator Co. Ltd., Hamilton, Ont., to Hamilton Bridge Co., Hamilton, Ont.

1450 tons, land plane hangar, naval air base, Alameda, Calif., to Moore Drydock Co., Oakland, Calif.

1275 tons, state of Oklahoma highway department; 825 tons for Wyandotte, Okla. to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.; 450 tons for Pensacola, Okla., to Capitol Steel & Iron Co., bids Sept. 24.

1035 tons, press shop extension, Camden Forge Co., Camden, N. J., to Belmont Iron Works, Eddystone, Pa.

1010 tons, building, Saginaw Steering Wheel division, Chevrolet Motor Co., Saginaw, Mich., to Whitehead & Kales Co., Detroit.

1000 tons postoffice garage, Boston, Bethlehem Steel Co., Bethlehem, Pa.; Volpe & Grande Inc., Malden, Mass., contractor.

1000 tons, extensions to plant, for Northrop Aviation Inc., Hawthorne, Calif., to Bethlehem Steel Co., Bethlehem, Pa.

920 tons, gate towers for Tennessee valley authority, Kentucky dam, Kentucky, to Lakeside Bridge & Steel Co., Milwaukee.

825 tons, mineral industrial building, University of West Virginia, Morgantown, W. Va., to American Bridge Co., Pittsburgh.

810 tons, bridge, FAP-486-C, Ottawa county, Oklahoma, to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.

758 tons or more, Bonneville powerhouse foundations, to Schmitt Steel Co., Portland; Puget Construction Co., Seattle, general contractor.

750 tons, addition for Dominion Foundries & Steel Co. Ltd., Hamilton, Ont., to Hamilton Bridge Co., Hamilton, Ont.

737 tons, state of Oklahoma highway department, 500 tons for Shattuck, Okla., and 237 tons for Manitow, Okla., to Capitol Steel & Iron Co.; bids Sept. 3.

660 tons, powder house, Hercules Powder Co., Pepper, Va., to Ingalls Iron Works, Birmingham, Ala.

540 tons, plant addition, Erie Forge Co., Erie, Pa. to Erie Steel Construction Co., Erie, Pa.

535 tons, machine shop addition, Camden Forge Co., Camden, N. J., to Belmont Iron Works, Eddystone, Pa.

510 tons, extension, Owens-Illinois Glass Co., Bridgeton, N. J., to Pittsburgh Bridge & Iron Works, Rochester, Pa.

500 tons, office building, Consolidated Machine Tool Co., Rochester, N. Y., to Leach Steel Corp., Rochester, N. Y.

500 tons, warehouse buildings, Edgewood arsenal, Edgewood, Md., to Belmont Iron Works, Philadelphia.

485 tons, machine shop, Ecusta Paper Mill, Pisgah Forest, N. C., to Carolina Steel & Iron Co., Goldsboro, N. C.

450 tons, United States postoffice, Enid, Okla., to J. B. Klein Iron & Foundry Co., Oklahoma City, Okla.; bids Sept. 10.

450 tons, addition for Dominion Textile Co. Ltd., Montreal, Que., to Dominion Reinforcing Steel Co. Ltd., Montreal, Que.

450 tons, bridge, Otto river, Royalston, Mass., Boston & Maine railroad, to Bethlehem Steel Co., Bethlehem, Pa.; T. Stuart & Sons Co., Watertown, Mass., contractor.

450 tons, steel wales, naval air station, Quonset Point, R. I., divided, Belmont Iron Works, Eddystone, Pa., and Phoenix Bridge Co., Phoenixville, Pa.; Merritt-Chapman & Scott Corp. and George H. Fuller Co., New York, joint contractors.

390 tons, state highway bridge, Linn county, Missouri, to Stupp Bros. Bridge & Iron Co., St. Louis; bids Sept. 27.

380 tons, shop building, Commonwealth Edison Co., Chicago, to Vierling Steel Works, Chicago.

370 tons, warehouse, Sears-Roebuck Co., St. Louis, to Mississippi Valley Structural Steel Co., Decatur, Ill.

350 tons, plant addition, Edward G. Budd Mfg. Co., to Belmont Iron Works, Philadelphia.

350 tons, armor plate plant, Henry Disston & Sons Inc., Philadelphia, to Montgomery Iron & Steel Co., Philadelphia.

335 tons, warehouses, Patterson Field, Ohio, to Gulbert Steel Co., Pittsburgh.

310 tons, buildings, St. Mary's Craft Corp., St. Mary's, Ga., to Virginia Bridge Co., Roanoke, Va.

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Rule of thumb steel making

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Days when guesswork could be tolerated in a steel mill belong to the past—guesswork costs too much today. Spoilage—lost time and material—inefficient operation—these things rob a plant of profits.

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310 tons, main storage building, navy, Pensacola, Fla., to Southern Steel Works Co., Birmingham, Ala.

300 tons, factory and office building, Bastian-Blessing Co., Chicago, to Frisch Corp., Chicago; bids Sept. 18.

300 tons, prefabricated buildings, Philadelphia navy yard, to Truscon Steel Co., Youngstown, O.; general contractor, M. & L. Construction Co., Philadelphia.

280 tons, state bridge, New Haven, Ky., to Bethlehem Steel Co., Bethlehem, Pa.

280 tons, state highway bridge, route 395, Hall, Pa., to Fort Pitt Bridge Works, Pittsburgh.

275 tons, Illinois state highway bridge, Hillview, Ill., to Illinois Steel Bridge Co., Jacksonville, Ill.; bids Sept. 20.

260 tons, airport, Stockton, Calif., to Judson-Pacific Co., San Francisco.

250 tons, storage and office building, for Steel Sales Corp., Detroit, to Taylor & Gaskin Inc., Detroit.

250 tons, state highway bridge, PSC 5996, Orchard Park, N. Y., to Bethlehem Steel Co., Buffalo.

245 tons, municipal hangar, Denver, Colo., to Minneapolis Steel & Machinery Co., Minneapolis.

244 tons, Texas state bridge, Hill county, to North Texas Iron & Steel Co., Fort Worth, Tex.

240 tons, state highway bridge, route 33013, Brookville, Pa., to Fort Pitt Bridge Works, Pittsburgh.

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230 tons, maintenance building, O'Hara township, Pennsylvania, for Allegheny county, to Levinson Steel Co., Pittsburgh.

205 tons, gymnasium and auditorium, Catholic Institute, Pittsburgh, to Pittsburgh-Des Moines Steel Co., Pittsburgh.

198 tons, steel piling, Colorado river Indian irrigation project, invitation 107 and 103, Colorado, to Bethlehem Steel Co., Bethlehem, Pa.

185 tons, highway bridge R169, section 12, Luzerne county, Pennsylvania, to Pine Brook Iron Works, Scranton, Pa.

185 tons, addition, Leland-Gifford Co., Worcester, Mass., to Strafford Iron Works, Worcester.

170 tons, columns and girders, Bausch Memorial building, Rochester, N. Y., to F. L. Heughes & Co. Inc., Rochester, N. Y.

155 tons, towers and girders, bridge No. 59, Great Northern Railway Co., to Pacific Car & Foundry Co., Seattle, Wash.

150 tons, state bridge, Hill City, S. Dak., to Bethlehem Steel Co., Bethlehem, Pa.

150 tons, state bridge, Dornsife, Pa., to American Bridge Co., Pittsburgh.

140 tons, two war department theatres, Rantoul, Ill., for government, to Midland Structural Steel Co., Cicero, Ill.

140 tons, Washington state bridge, Snohomish county, to Pacific Car & Foundry Co., Seattle; David Nygren, Seattle, general contractor.

132 tons, steel piling, irrigation project, Parker, Ariz., inquiry L-395, Parker, Ariz., to Bethlehem Steel Co., Bethlehem, Pa.

130 tons, state highway bridge HU-20-109, Monroeville, O., to Burger Iron Co., Akron, O.

125 tons, bridges, Atchison and Sherwin, Kans., for Missouri Pacific railroad, to Bethlehem Steel Co., Bethlehem, Pa.

125 tons, state highway bridge, Chapmans, Pa., to Phoenix Bridge Co., Phoenixville, Pa.

125 tons, building addition, Hooker Electro Chemical Co., Niagara Falls, N. Y. to Buffalo Structural Steel Co., Buffalo.

120 tons, Texas state bridge, Wise county, to North Texas Iron & Steel Co., Fort Worth, Tex.

115 tons, building, Vallejo, Calif., for Pacific Telephone & Telegraph Co., to Golden Gate Iron Works, San Francisco.

115 tons, mill extension, Bibb Mfg. Co., Porterdale, Ga., to Calvert Iron Works Inc., Atlanta, Ga.

110 tons, temporary building, Curtiss-Wright Co., St. Louis, to Truscon Steel Co., Youngstown, O.

105 tons, state highway bridge PSC-5341 Ontario county, New York, to Genesee Bridge Co., Rochester, N. Y.

100 tons, beam spans, bridges, Maine, various locations, to Phoenix Bridge Co., Phoenixville, Pa.

100 tons, store building, Main & Division Co., Niagara Falls, N. Y. to R. S. McMannus Steel Construction Co. Inc., Buffalo.

Shape Contracts Pending

7000 tons, new plant, Curtiss Aeroplane division, Curtiss-Wright Corp., Buffalo, N. Y., cost $12,000,000; duplicate plants to be built in Columbus, O., and St. Louis, Mo.

4500 tons, six grade crossing eliminations, Long Island railroad, Atlantic ave., Brooklyn, N. Y.; A. A. Johnson Corp. and Necarro Corp., joint low bids.

2700 tons, three hangars, invitation 6813-41-36, Elmendorf field, Anchorage, Alaska; Bethlehem Steel Co., San

Francisco, low.

2000 tons, ship fitters shop, Philadelphia navy yard; Hughes Foulkrod Co., Philadelphia, contractor.

1200 tons, extensions to mill building, for Republic Steel Corp., Cleveland.

1000 tons, including cast iron, 756-foot, three-span, cantilever state bridge, Spokane river, Washington state; bids to Olympia Oct. 22.

946 tons, Mokelumne river bridge, Sacramento and San Joaquin counties, Calif., for state; United Concrete Pipe Co., low.

900 tons, double hangar, invitation 6812-41-14, Hickam Field, T. H.; Robt. McKee, 4700 San Fernando boulevard, Los Angeles, low on general contract at $359,500.

850 tons, extension to building 94, torpedo station, Newport, R. I., for navy.

800 tons, reconstruction of bridge, Twelfth street, Kansas City, Kans., for Wyandotte county.

750 tons, hoppers, building and conveyer bridge, for Consolidated Edison Co., New York.

700 tons, sheet steel piling, Contract 33, Marginal street project, Thirty-sixth to Forty-first sts., New York; Nicholas Dimenna Co., Bronx, N. Y. low bid.

600 tons, addition to hospital, Roberval, Que.

500 tons, seaplane hangar, Tongue Point, Oreg., for navy.

500 tons, plant for Canadian Motor Boat Co. Ltd., Anger and St. Patrick streets, Montreal, Que.

400 tons, addition to city hall, Shawinigan Falls, Que.

370 tons, bridge over Spoon river, Seville, Ill., for Toledo, Peoria & Western railroad.

350 tons, hospital for Sisters of Hotel Dieu, Bathurst, N. B.

350 tons, intake gate rail support towers, Watts bar dam, Tennessee, for Tennessee valley authority, Knoxville, Tenn.

330 tons, addition to mill building, for Elliott Co., Jeannette, Pa.

300 tons, building, Frankford arsenal; Henry W. Horst Co., Philadelphia, contractor.

300 tons, spillway bridge, Kentucky dam, Gilbertsville, Ky., for Tennessee valley authority, Knoxville, Tenn.

280 tons, crane tracks, Philadelphia, for navy.

220 tons, crane runway, for American Brake Shoe & Foundry Co., Chicago.

215 tons, market building, Moore street, Brooklyn, N. Y., for city.

190 tons, factory building, Charles Bruning Co., Chicago; bids Oct. 9.

180 tons, roof over grain storage, for Osborne-McMillan Elevator Co., Minneapolis.

165 tons, building, for Chesapeake & Potomac Telephone Co., Silver Spring, Md.

160 tons, market building, Arthur avenue, Bronx, New York, for city.

155 tons, motor oil storage building, for Standard Oil Co. of New Jersey, Baltimore.

150 tons, state highway bridge, Corfu, N. Y.; bids Oct. 16.

150 tons, field house, Lawrenceville, N. J., for Lawrenceville academy.

150 tons, new terminal, Greyhound Bus, Buffalo; bids Oct. 15.

145 tons, state overcrossing, Chelan county, Washington; bids to Olympia, Oct. 22.

140 tons, girls' dormitory, Greendale, Ky., for state.

135 tons, factory building, for Charles Bruning Co., Chicago.

130 tons, state bridges FAP-138-A (1), Duncan, Ariz.

125 tons, gate frames, specification 1437, bureau of reclamation, Earp, Calif; bids opened.

120 tons, Caney creek bridge, Watts Bar dam, Tennessee, for state.

119 tons, including cast steel, two state bridges in Spokane and Snohomish counties, Washington; bids to Olympia, Oct. 22.

110 tons, bottling plant, for Coca Cola Bottling Co., Troy, N. Y.

100 tons, shipfitting assembly building, Puget Sound navy yard; A. F. Mowat, Seattle, general contractor.

100 tons, addition to foundry building, Fairbanks, Morse & Co., Beloit, Wis.; bids Oct. 8.

Unstated, rotor platform, girders and other items, Coulee power house; American Bridge Co., low.

Unstated, three ammunition industrial buildings, Keyport naval station, Wash., Dally Construction Co., Seattle, low at $175,950.

Tin Plate

Tin Plate Prices, Page 246

Operations are steady at 40 per cent of capacity. Buying is light, deliveries running ahead of new

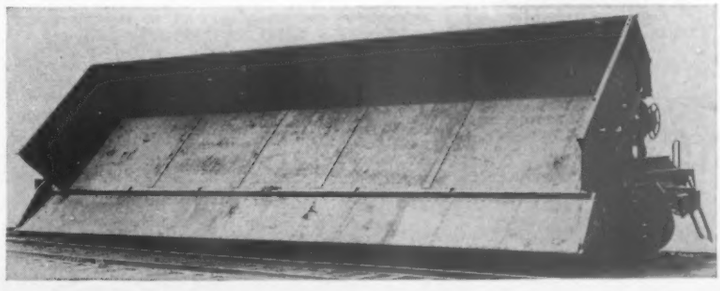
I MADE THE MISTAKE ONCE . . .

of thinking waste disposal costs could not be reduced

"Once is enough to make a mistake—and this one cost money. I didn't realize how much until I installed the new Koppel 50-yard air-dump (which can take up to 65-yards) and saw waste disposal efficiency increased 60%—with a 27% reduction in initial cost! Take a tip from the lesson I learned —install the big Koppel Air-Dump car and *dump* your excess costs."

Would you like to know the details?

KOPPEL



In several large plants Koppel fifty cubic yard air dump cars have actually produced the savings mentioned above. May we furnish the facts?

PRESSED STEEL CAR CO., INC.

KOPPERS BUILDING (Koppel Division) PITTSBURGH, PA.

NEW YORK CHICAGO

buying. Inventories are fairly high, but are being reduced slowly. With 1940 crops below expectations can companies had found stocks more than adequate. However, additional stocks will be bought after Dec. 1. In New England the cranberry pack is taking fewer cans than usual. In that district a baking powder manufacturer has sold its can-making department to a large national can manufacturer.

A purchase is being made of 1500 tons of tin plate for shell containers on a sub-contract, through Picatinny arsenal.

Reinforcing

Reinforcing Bar Prices, Page 247

Pittsburgh — Business continues good, with prices strong in the eastern territory, although west of the Pittsburgh district tonnage is light and prices are weak. All recently placed orders in New England and eastern seaboard markets, as well as the local market, are at the full price, with a few minor exceptions.

Chicago—An active market prevails in reinforcing bars although current awards are small and inquiries few. Most of the business is for western states. Tonnages for local jobs range from 100 tons downward. In most instances, quick deliveries are wanted and mills are cautious about accepting orders under this obligation. General construction and roadwork are both active fields.

Boston—While most current reinforcing bar requirements are being filled from stock, mill deliveries, which range close to 60 days, are more extended. Prices are firmer, but shading on rail steel has not entirely disappeared. Outstanding purchase of 1250 tons for a Connecticut bridge foundation is accompanied by a 315-ton lot for housing units, New Bedford, Mass. More small-lot orders are being placed.

Philadelphia — Reinforcing tonnage is heavy but few large jobs have been closed here recently. Prices are firmer, especially on small lots. Award of 3000 tons for the Poplar street housing project is still awaited.

Seattle—Rolling mill backlogs are higher, many small awards featuring the current market. Merchant bars are active and moving in larger volume, both for jobbers' stocks and construction projects. Prices are firm. Several sizable projects are developing and bids will be asked soon.

San Francisco — Reinforcing bar lettings, with two exceptions, were confined to lots of less than 100 tons, and only 310 tons were booked, bringing the total for the year to 135,050 tons, compared with 134,900 tons for the same period last year.

Reinforcing Steel Awards

1200 tons, postoffice garage, Boston, Josept T. Ryerson & Son Inc. Chicago; Volpe & Grande Inc., Malden, Mass., contractor.

1005 tons, tank factory, Chrysler Corp., Detroit, to Bethlehem Steel Co., Bethlehem, Pa.

750 tons, housing project, Lawrence, Mass., to Concrete Steel Co., New York; Thomas O'Connor & Co., Cambridge, Mass., contractor.

600 tons, powder plant, Charlestown,

Concrete Bars Compared

	Tons
Week ended Oct. 12	5,705
Week ended Oct. 5	18,191
Week ended Sept. 28	18,674
This week, 1939	11,081
Weekly average, year, 1940	9,508
Weekly average, 1939	9,197
Weekly average, Sept.	10,611
Total to date, 1939	401,539
Total to date, 1940	389,838

Includes awards of 100 tons or more.

Therm-O-flake
INSULATION BRICK

One of lightest insulation brick available—(about one pound each).

Has low thermal conductivity, and is most economical for efficient insulation.

Can be compacted without breaking and cuts easily.

Especially valuable for back up work behind fire brick walls.

Acts as expansion cushion between furnace walls and binding structure.

Write for Information and Prices

Other Therm-O-flake Products
Made from Exfoliated Vermiculite
Granules - Brick - Block - Concrete

Illinois Clay Products Company
JOLIET, ILL.

Ind., to Colonial Supply Co., Louisville, Ky.

500 tons, Seagram distillery building, Louisville, Ky., to American Builders Supply Co., Louisville, Ky.

315 tons, housing project, New Bedford, Mass., to Truscon Steel Co., Youngstown, O.; Rathgeb-Walsh Inc., Port Chester, N. Y., contractor.

300 tons, two air corps operations hangars, Southeast air base, Mobile, Ala., to Joseph A. Fox Co., Birmingham, Ala.; A. J. Rife Construction Co., Dallas, Tex., contractor, $859,150, bids Sept. 26.

292 tons, processing building, Armour & Co., Kansas City, Mo., to Truscon Steel Co., Youngstown, O.; Swensen Construction Co., Kansas City, contractor; small tonnage miscellaneous structural steel awarded Builders Steel Co., Kansas City, Mo.

165 tons, bridge, Fairland, Okla., to Sheffield Steel Corp., Kansas City, Mo.

158 tons, addition, receiving station, navy yard, Washington, to Fort Pitt Bridge Works, Pittsburgh; Bahen & Wright, Washington, contractor.

114 tons, bridge, Glacier Park, Mont., to Bethlehem Steel Co., Bethlehem, Pa.

106 tons, bridge, Winona, Minn., to Truscon Steel division, Republic Steel Corp., Youngstown, O.

100 tons, plant building, Goss Printing Press Co., Chicago, to Truscon Steel division, Republic Steel Corp., Youngstown; Austin Co., Cleveland, contractor.

100 tons, bridge, Otto river, Royalston, Mass., Boston & Maine railroad, to Bethlehem Steel Co., Bethlehem, Pa.; T. Stuart & Son Co., Watertown, Mass., contractor.

Reinforcing Steel Pending

1360 tons, housing project, Vallejo, Calif; Barrett & Hilp, San Francisco, low.

1130 tons, cold storage building, specification 9974, naval fleet supply base, Oakland, Calif; bids opened.

1127 tons, in addition to 250 tons wire mesh, additions, naval ammunition depot, Hawthorne, Nev., general contract to Wm. P. Neil Co., 4884 Loma Vista, Calif., at $2,126,000.

1000 tons, federal housing project, Oakland, Calif; bids Oct. 16.

975 tons, two storehouses, invitation 10034, naval fleet supply base, Oakland, Calif; general contract to Monson Bros., San Francisco.

500 tons, U. S. veterans hospital, Marion, Ill.; bids Oct. 8.

500 tons, six grade crossing eliminations, Long Island railroad, Atlantic ave., Brooklyn, N. Y.; A. A. Johnson Corp. and Necarro Corp., joint low bidders.

350 tons, postoffice at Cairo, Ill.; bids Oct. 9.

300 tons, Contract 33, Marginal street project, Thirty-sixth to Forty first sts., New York, Nicholas Dimenna Co., Bronx, N. Y., low bid.

275 tons, highway projects, contracts 4013 and 4019, Lincoln-North Smithfield and Westerly-Charlestown, R. I.; bids in.

204 tons, warehouse, Sherwin-Williams Co., Chicago; William E. O'Neill, Chicago, contractor.

175 tons, conveyor tunnel for coal and dried sludge, Stickney, Ill.; Marsh Construction Co., contractor.

169 tons, highway work, Santa Clara county, California, for state; bids Oct. 30.

165 tons, invitation 6813-41-51, Alaska air base; Gilmore Fabricators Inc., San Francisco, low.

160 tons, bus storage and shop building, Seattle transportation commission; Hendrickson & Alstrom, Seattle, low.

143 tons, Mokelumne river bridge, Sacramento and San Joaquin counties, California, for state; United Concrete Pipe Co., low.

135 tons, six underground and four port ordnance magazines, Hamilton Field, Calif; bids Oct. 18.

126 tons, Washington state highway projects; bids at Olympia, Oct. 22.

124 tons, underpass, Sunol, Calif., for state; bids Oct. 30.

Unstated, barracks, 1045 hospital and other structures, Fort Lewis, Wash.; Sound Construction & Engineering Co., Seattle, and Peter Kiewitt & Sons, Omaha, joint low bidders, $6,390,000.

Pig Iron

Pig Iron Prices, Page 248

Pittsburgh—Some buyers are worried about the possibility of a shortage of basic pig iron before the winter is over. Buying has been fairly active and there have been some rumors of price increases, but no definite action has been reported.

Cleveland—Some melters have enough iron in yards or on contract to last through May. Producers are plainly disturbed over increasing

Notice
to Fabricators and Users of
STAINLESS STEEL EQUIPMENT

★

The Nirosta Corporation is prepared to grant licenses to fabricators and prospective users of stainless steel equipment under its patent No. 2,200,229, and under claims 1 and 2 of its patent No. 2,186,710.

Patent No. 2,200,229, issued May 7, 1940, covers non-heat treated welded constructions composed of an austenitic steel containing about 18% to 25% chromium, about 7% to 12% nickel, and less than .07% carbon. This steel is generally known as "low carbon alloy."

Patent No. 2,186,710, issued January 9, 1940, covers, by claims 1 and 2 thereof, articles of welded construction made of a stable austenitic alloy composed of approximately 18% to 25% chromium, approximately 7% to 12% nickel, a small proportion of carbon and an additional alloy constituent, having the property possessed by titanium of forming a stable chemical compound with the carbon. We are prepared to grant licenses under these two claims for the manufacture of welded articles of such an alloy in which the "additional alloy constituent" is columbium.

To obtain copies of the patents and information as to license conditions and fees, address the undersigned.

THE NIROSTA CORPORATION

27 WILLIAM STREET NEW YORK

tightness of the situation and are doing their best to bring in specifications and induce regular customers to place more iron where advisable. The situation is more tense than a week ago. Agents must now receive confirmation from principals before booking new tonnages. Certain analyses are extremely scarce. Producers will now sell only to regular customers. An inquiry for basic iron running well into five figures is current. Despite tightness pig iron men do not look for their product to be the first bottleneck, expecting coke, fluorspar, steel scrap and perhaps other products to be of famine nature first.

Chicago—Demand for merchant pig iron and foundry coke, which has been building up week by week, has now reached near full capacity. Furnaces and suppliers are being hard pressed to make deliveries and are two to five days behind on shipments. Foundries, increasing their melts as castings demand grows, are pressing for supplies. Shipments are about one-fourth larger than in the corresponding period of September. No easing in the situation can be seen in the face of present conditions. Prices on pig iron and coke are exceedingly firm.

Boston—Coverage on pig iron for fourth quarter delivery is practically complete and shipments are well ahead of last month. Heavier movement of iron to consumers is due largely to greater melt, most classes of foundries being included. However, numerous consumers appear to be holding moderate reserve stocks stationary and releasing new shipments for current needs, pressing for prompt delivery. All grades share in the improvement, demand for malleable for finer gray iron work being notable. Foundries producing lighter work are getting an overflow from the heavier shops while those supplying the machine tool trade are near capacity with heavy backlogs.

New York—Pig iron consumption is increasing daily, with some producers falling behind on production and with small stocks. Machinery foundries continue to take most of the iron but demand is increasing from many other diversified sources.

Philadelphia—Shipments are moderately ahead of a month ago as foundry operations continue to expand. Influence of defense work is more apparent although largely indirect. Buying is less active, following previous coverage but some users are placing additional tonnage. October deliveries are expected to reach a peak for the year to date.

Buffalo—With consumers actively placing releases against substantial fourth quarter bookings, producers are forced to draw from reserve stocks to meet deliveries. No apprehension, however, is expressed over the supply situation.

Cincinnati — Policies already adopted by some Southern furnaces indicate planning to favor old customers if and when there is a pinch in the pig iron supply. Restrictions are not yet in force and deliveries also are fairly prompt. However, melters are advised to get specifications in early. Northern iron deliveries are from stock and not retarded. Foundries which bought conservatively last summer are in the market for iron to fill out quarter needs.

St. Louis—Shipments of pig iron this month are reported at a higher daily average rate than in September, which had produced the largest total this year. Sellers report that releases have increased, and there is every indication that contracts will be thoroughly cleaned up by the end of December. While the melt generally continues to expand, it is evident that many users are taking in more than necessary for current needs. There is a general disposition where possible to build up inventory

FOR NATIONAL DEFENSE

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Reciprocating Heating Machines in various sizes, with a full muffle for controlled atmosphere, or open hearth to produce a thin freely shedding scale, give uniform quality hardening.

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Rotary Retort Continuous Heating Machines with hopper feed to uniformly anneal brass cases in the various stages of manufacture.

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A cast link belt conveyor Heating Machine 3' wide by 14' long is proving itself highly satisfactory for this requirement.

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Representatives located in principal cities

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American Gas Furnace Co.
Elizabeth, New Jersey

against future needs and possible scarcity.

Birmingham, Ala.—Merchant pig iron producers report some increase in shipping instructions, and are not stacking a great deal of iron.

Scrap

Scrap Prices, Page 250

Pittsburgh—No. 1 steel has moved up another 50 cents to $22 top, although the bottom quotation of $21 remains, due to offerings at that price by some brokers. Buying interest in open hearth grades continues light in the immediate district, although nearby points are paying premium prices and succeed in getting fair tonnages.

Cleveland—Fisher Body Co. will ask bids on 450 cars of compressed sheets Oct. 15 and more such offerings are expected. Supplies of good heavy scrap are limited. No further offerings from railroads are noted. Many in the western area are holding for expected higher levels. Prices are decidedly firm.

Chicago—Iron and steel scrap is somewhat easier than a week ago, with No. 1 heavy melting steel down to $19.50 to $20, a drop of 50 cents a ton. On the other hand, rails for rerolling are up $1 to $24 to $24.50. Mills seem well supplied at the moment, in spite of near full-capacity operations of 98 per cent, and a fair amount of tonnage is being moved.

Boston—Scrap buying by the foundry trade is slightly more active, notably cast grades, with No. 1 machinery cast 50 cents higher for New England and Eastern Pennsylvania delivery. Specification pipe has also advanced 50 cents a ton with other grades for domestic consumption steady, but for the most part unchanged. Machine shop turnings, however, for Eastern Pennsylvania, have a stronger tone. The final shipment to Japan, just previous to the embargo, was approximately 7000 tons loaded at Boston and Providence, R. I., mostly No. 2 heavy melting and bundles. Despite the elimination of Japan as a consumer, heavy melting steel prices for export are firmer with a range up to $17.50 for No. 1, dock, and $16.25 for No. 2, although most tonnage being bought for Great Britain is at $17 and $16 respectively.

Philadelphia—Scrap prices tend upward in some grades, although heavy melting steel is unchanged. Mills generally are inactive pending developments at Washington with reference to scrap process, but shipments continue against orders. Steelworks stocks are moderate in relation to heavy consumption. A boatload of 3500 tons for Japan is delayed by damage to the vessel and may not be able to sail before the deadline. Only 8000 tons of scrap was exported to Japan from this area in eight months this year.

Buffalo—Dealers continue to ship against contracts on the basis of the prevailing range of $20 to $20.50 a ton for No. 1 material. Boat receipts continue heavy. A steady to strong tone rules.

Detroit—Despite speculative pressure on some commodities, going prices quoted by leading dealers and brokers hold fairly evenly, slight increases having been made in compressed sheet bundles and loose clippings. Current quotations in the Detroit area are still 50 cents to $2 a ton below the peak registered in 1937, in spite of high mill production.

Cincinnati — Iron and steel quotations are unchanged although the high steelmaking rate and conditions in nearby districts make for a strong market. Mills have slackened their buying pace, and are showing more resistance to advancing prices.

St. Louis—After several weeks of

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A Youngstown welded Monel pickling crate has all the essentials you need for good pickling—*and only the essentials!* While the welded Monel construction cuts weight to the minimum, these strong, tough crates stand the gaff of rough handling, heavy loads, and corrosive chemicals for years and years. "Copper flash" is eliminated by using Monel. By doing more pickling per pound of equipment, by lasting much longer, a Youngstown Monel crate really does do the work of two ordinary pickling crates. Think of the savings a light-weight welded Monel crate effects: in labor, power, repairs and replacements, boosting your payloads, and providing an ample safety factor at the same time. It would be good business to get a quotation today on a crate for your pickling operations.

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advancing prices, the market for iron and steel scrap has leveled off. Purchases of steel specialties and No. 2 heavy melting steel by east side plants aggregated between 6000 and 8000 tons for delivery over the next 60 days. Offerings are somewhat freer and there are evidences of southern scrap, which would ordinarily be exported, backing to this market but without effect on prices.

Birmingham, Ala.—While extremely active in virtually all the wanted items, particularly heavy melting steel and No. 1 cast, scrap prices are steady. In addition to open hearth furnace requirements, foundries are using considerable cast scrap.

Toronto, Ont. — Dealers advanced buying prices on some lines of steel scrap during the week, while demand continued brisk for all classes of scrap. Low phos steel scrap was moved up 50 cents to $12.50; cast borings, 75 cents to $7.50 and steel turnings 25 cents to $7.50, and dealers now are offering $7.25 for mixed borings and turnings. Other materials are unchanged. Large consumers are making special efforts to place forward delivery contracts but dealers are holding commitments to a week or two.

Seattle — As the deadline approaches, exporting houses are making every effort to clean up commitments, expressing doubt that this can be accomplished. No new export business is being accepted. More activity at rolling mills has increased domestic demand for scrap. Great Britain is the only remaining foreign customer and Pacific Coast ports are handicapped in that direction by scarcity of space and higher freights than from Atlantic centers.

San Francisco—Japanese exporters have no trouble in securing scrap but find it difficult to obtain bottoms. Japanese vessels now in coast ports are turning down all other merchandise to load scrap before the deadline. Prices have eased 50 cents a ton on heavy melting steel and compressed sheets.

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HACKNEY manufacturing facilities have played an important part in the solution of numerous problems in many industries. As a result, a number of manufacturers have been able to effect product improvements and at the same time to reduce their costs.

This deep drawn liquid receiver is one of the several special products manufactured by Hackney for the refrigeration industry. It is suitable for 250 lb. per sq. in. working pressure. Note that the vessel is equipped with two bull's-eye fittings which consist of ground glass inserts of approximately ½" thickness. They are held in place by special gaskets and with a brass ferrule retainer. With these bull's-eyes, it is a simple job to gauge the amount of liquid refrigerant in the receiver.

In availing themselves of Hackney design and manufacturing facilities, manufacturers get the benefits of Pressed Steel Tank Company's more than 35 years' experience in the manufacture of special shapes and shells from many types of metals. Through positive control of heat treatment, X-ray control of welding and numerous other Hackney procedures, they are assured of better, more dependable products at lower costs. Whatever industry you are in, you may find Hackney's facilities beneficial and profitable. A Hackney engineer will be glad to cooperate with you in developing new shells or shapes or improve on those now being used. There is no obligation—write for details.

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Containers for Gases, Liquids and Solids

Warehouse

Warehouse Prices, Page 249

Cleveland—Some jobbers find especially good demand for thick plates to be used for bases of machine tools. The plates, many three to four inches thick, are cut to pattern by torch and in many cases laminated. Steel buying is well diversified and gaining.

Chicago — Warehouse demand moves upward as manufacturing plants expand operations and find stocks of materials dwindling. Demand is greatest for alloy bars and some grades and sizes of carbon bars. Heavy products, such as structurals and plates and reinforcing bars and pipe are active.

Boston—Lengthening mill deliveries are reflected in additional tonnage placed with warehouses, prompt shipment being a factor in heavier small-lot volume, notably in alloys. Demand is well diversified, including plates and shapes.

New York—Buying is brisk with aggregate tonnage booked ahead of September, which was one of best months in recent years. Slower mill deliveries are turning more consumers to jobbers. Demand for alloys is opening gaps in warehouse stocks, notably certain sizes and qualities of electric furnace steels which are kept balanced with difficulty. Mill deliveries are 10 to 12 weeks on some items.

Philadelphia — Warehouse sales are up sharply this month, indicating a broad upturn in consumption. Orders for some distributors in the first ten days were more than 30 per cent ahead of a month ago.

Buffalo—Warehouse business continues to expand. Due to an upward revision in mill extras some of the alloy bar series have been raised

ten to 25 cents per 100 pounds.

Cincinnati — Jobbers face a brisk demand with prospects for a better month than September because of industrial needs for material on which mill shipments are delayed.

St. Louis — Seasonal influences, plus betterment in the general business situation and some government business, are responsible for further improvement in sales of steel from store. October volume is expected to exceed September by a liberal margin. Belated mill deliveries are causing scarcity of some items, notably special steel and some widths of strip.

Seattle—Demand is well diversified and volume of sales continues steady, turnover being appreciably larger than during the summer. Prices are unchanged.

Steel in Europe

Foreign Steel Prices, Page 249

London — (*By Cable*) — Intensive output of steel and iron continues uninterruptedly in Great Britain. Control is being further tightened on ordinary commercial transactions. Large supplies of scrap and semi-finished steel are arriving from the United States and the Dominions. Tin plate production is steady and some orders are being booked from South America and the Dominions. Only small tonnages of black and galvanized sheets are available for export.

It is understood that the question of whether the controlled steel and iron prices should be raised is now under discussion but no decision appears to have been reached.

Bolts, Nuts, Rivets

Bolt, Nut, Rivet Prices, Page 247

The market is exceptionally strong and active. Incoming business so far this month surpasses the volume of September, though sales that month had been the largest in years. Producers state that armament business is just beginning to get under way and a tremendous demand is expected within a few months. However the makers are confident of being able to handle the orders and produce the materials. Large bolts, ¾ inches and up, have been advanced in price 6 to 12 per cent.

Export business is featured by large orders from Great Britain and its dominions and the Dutch East Indies are placing substantial business.

Fluorspar

Fluorspar Prices, Page 248

Cleveland — Prices of domestic fluorspar have again been reduced $1 per net ton by a leading interest. New prices are $19 to $20 per ton. This is the second $1 cut since Sept. 1. With imports shut off and several domestic mines flooded, raw material sellers expect a shortage of fluorspar within six months.

Equipment

Seattle — Dealers report a steady volume, public works awards predominating. Willamette Iron & Steel Corp., Portland, Oreg., is low to Denver at $20,962, for furnishing machinery for handling gates at Bonneville dam. Pennsylvania Transformer Co. is low to Tacoma for furnishing three 15,000-kva units for power intertia system. Seattle transportation commission has received bids for warehouse and shop sprinkler system. I. E. T. Circuit Breaker Co., Philadelphia, low at $164,300, has the contract to furnish 5000-ampere bus structures for Coulee powerhouse. General Electric Co., low at $21,000, will furnish a 5000-ampere circuit breaker for Coulee Dam. Bids will be called soon for construction

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CLEANER FINISH
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of 51-mile, steel tower transmission line Bonneville to Oregon City, Oreg.

Coke Oven By-Products

New York — Heavy production of coke oven by-products is being moved into consuming channels with little accumulation except where seasonal influences prevail. Distillates are active against contracts and shipments are sufficient to limit spot supplies. Releases by the lacquer trade are heavier. Naphthalene is affected by the off-season in household demand, but chemical requirements are fair. For plastics, buying of phenol is gradually improving. Contract shipments of sulphate of ammonia are large, with little spot material available, on which $29 per ton, f.o.b. port, is quoted to December.

Nonferrous Metals

New York—Increased demand arising from the national defense program coupled with a high rate of consumption in normal channels is now exerting a strengthening influence on all major metal markets. Producers generally are well sold ahead and are being pressed for nearby delivery.

Copper—Casting copper advanced ⅛-cent on Friday following a like rise in the red metal scrap market and a firmer tone in the resale electrolytic market. Fabricators are using larger tonnages of foreign copper in filling their British orders, resulting in an advance in the export price to 10.25c to 10.37½c, f.a.s. New York. The producers' market held firm at 12.00c, Connecticut. Refined stocks dropped 13,417 tons last month to a total of 185,313 tons as refined output rose to 82,843 tons and apparent consumption to 96,485 tons.

Zinc—With slab zinc stocks now equal to only about two weeks' supply the tight situation continues. Metal for nearby delivery is scarce and inquiry has not been fully satisfied. Prime western held firm, however, on the basis of 7.25c, East St. Louis.

Lead—Sellers were forced to advance prices 25 points on Thursday due to sustained heavy demand. Sales have maintained a rate 10,000 tons in excess of monthly production. The upward revision to 5.25c, New York, will permit a larger flow of Mexican metal to this country, now quoted at about 2.44c, f.a.s. Tampico, Mexico.

Tin—A committee has been appointed to review eight proposals to establish a tin smelting industry in this country. Political tension in the Far East threatens our tin supply but so far there has been no interruption in shipments. Straits spot rose steadily last week from the 51-cent level to the close of 51.87½c.

American Steel & Wire Improves Worcester Plant

■ The largest rehabilitation and improvement program ever undertaken by the American Steel & Wire Co., subsidiary of United States Steel Corp., in Worcester, the cradle of the American wire industry, was announced last week by Carl I. Collins, Worcester district manager for the company.

The program includes four additions to the company's present South Works and complete rearrangement and improvements which will result in one of the most efficient wire mills in the United States.

The work will start immediately and plans call for completion within 20 months. The largest of the new buildings will house the manufacture of round and shaped wire and strip. This building will be 1035 feet long and 500 feet wide. It will permit the manufacture of all the company's steel products now produced in Worcester under one roof. Connected with this mill will be a new two-story office building and physical laboratory, occupying approximately 17,000 square feet of floor space.

The present spring mill at South Works will be rearranged and the rail bond and flat coiled spring operations will be consolidated in a new two-story building, 186 x 120 feet.

The company's copper facilities at Worcester also will be rearranged and consolidated in two new buildings.

When the new mill is completed the present North Works and Central Works will be abandoned and the present wire drawing building at South Works will be demolished.

"Capacity of the company's Worcester operations will not be increased by the new program," Mr. Collins said.

Nonferrous Metal Prices

	Copper										
Oct.	Electro, del. Conn.	Lake, del. Midwest	Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
5	12.00	12.00	11.62½	51.00	50.62½	5.00	4.85	7.25	18.00	14.00	35.00
7	12.00	12.00	11.62½	51.00	50.62½	5.00	4.85	7.25	18.00	14.00	35.00
8	12.00	12.00	11.62½	51.00	50.75	5.00	4.85	7.25	18.00	14.00	35.00
9	12.00	12.00	11.62½	51.25	50.87½	5.00	4.85	7.25	18.00	14.00	35.00
10	12.00	12.00	11.62½	51.87½	51.25	5.25	5.10	7.25	18.00	14.00	35.00
11	12.00	12.00	11.62½	51.87½	51.25	5.25	5.10	7.25	18.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.23
Copper, hot rolled	20.62
Lead, cut to jobbers	7.50
Zinc, 100 lb. base	12.50

Tubes

High yellow brass	21.98
Seamless copper	21.12

Rods

High yellow brass	14.76
Copper, hot rolled	17.12

Anodes

Copper, untrimmed	17.87

Wire

Yellow brass (high)	19.48

OLD METALS

Nom. Dealers' Buying Prices

No. 1 Composition Red Brass

New York	8.00-8.25
Cleveland	8.62½-9.12½
Chicago	7.75-8.25
St. Louis	8.37½

Heavy Copper and Wire

New York, No. 1	9.62½-9.87½
Cleveland, No. 1	9.37½-9.87½
Chicago, No. 1	9.37½-9.62½
St. Louis	9.37½

Composition Brass Turnings

New York	7.62½-7.87½

Light Copper

New York	7.62½-7.87½
Cleveland	7.37½-7.87½
Chicago	7.37½-7.62½
St. Louis	7.37½

Light Brass

Cleveland	4.12½-4.37½
Chicago	5.25-5.50
St. Louis	4.87½

Lead

New York	4.50-4.60
Cleveland	3.75-4.00
Chicago	3.85-4.10
St. Louis	3.50-3.75

Zinc

New York	3.87½-4.12½
Cleveland	3.25-3.50
St. Louis	3.50-3.75

Aluminum

Mis., cast, Cleveland	9.25-9.50
Borings, Cleveland	6.50
Clips, soft, Cleveland	14.25
Misc. cast, St. Louis	7.75-8.00

SECONDARY METALS

Brass ingot, 85-5-5-5, less carloads	12.50
Standard No. 12 aluminum	14.00-14.50

Died:

■ CLEMENT B. WOOD, 62, chairman of the board, Alan Wood Steel Co., Conshohocken, Pa., of heart disease, Oct. 5, at his estate Camp Discharge, Conshohocken. He had been chairman since 1937 and also president from that time until early in 1939. Mr. Wood was a grandson of the founder of the company and for many years served as company counsel. Born in Conshohocken, he was educated at Delancy school, Philadelphia, Harvard university, Harvard Law school and the University of Pennsylvania. For a number of years he was a member of the law firm of Morgan, Lewis & Bockius, Philadelphia. During the World war he became a major in the army and at the time of his death was a lieutenant-colonel in the reserves.

♦

William A. Shepard, 65, sales manager, American Fork & Hoe Co., Cleveland, in Cleveland, Oct. 8.

♦

Peter Kloeckner, 76, German industrialist and founder of the Essen Kloeckner steel mills, at Essen, Germany, Oct. 5.

♦

S. Everett Sproul, 78, president, Penn Steel Castings Co., Chester, Pa., at his home in Chester, Sept. 18.

♦

Max Rotter, 73, vice president in charge of engineering, Busch-Sulzer Bros. Diesel Engine Co., St. Louis, in that city, Oct. 6.

♦

Frank Staar, 82, president, Frank Staar & Sons Inc., sheet metal and roofing contractor, Chicago, at his home in East Hollywood, Calif., Oct. 3.

♦

Edgar H. Kern, 41, since 1929 purchasing agent, Weirton Steel Co., Weirton, W. Va., at his home in Steubenville, O., Oct. 6. Mr. Kern had been associated with Weirton 18 years.

♦

Paul A. Topel, 59, tool salesman who was associated with the Chicago office of Brown & Sharpe Mfg. Co., Providence, R. I., about 25 years, Oct. 4, in Chicago.

♦

William Howard Wright, 65, president-treasurer, Collins & Wright Inc., Pittsburgh, metal goods manufacturer, in that city, recently.

♦

Gustave R. Klatt, 61, since 1935 identified with the Cleveland Wire Spring Co., Cleveland, in that city, Oct. 6. He formerly was cost and production manager for National Acme Co.

An Amazing CONTRIBUTION To National Defense

In the present National Emergency, every possible measure must be taken to speed up production not only of armaments such as airplanes, guns, tanks and battleships, but also vital auxiliary equipment including trucks, tractors, railroad cars, locomotives and other steel products.

Fortunately, the capacity of existing equipment for machining steel parts can be doubled almost overnight by equipping them with KENNAMETAL-tipped tools. These tools can be quickly installed and their use requires little change in present shop practice.

KENNAMETAL, a new discovery in carbide tool materials, machines extremely hard steel at greatly increased speeds and with far less "down time" for resharpening tools. Do your share to speed up National Defense—wire, write or phone today for a free survey to show how KENNAMETAL can double production of steel parts in your plant. No obligation—act now!

McKENNA METALS Co
200 LLOYD AVENUE
LATROBE, PENNSYLVANIA, U.S.A.

In the Pickling Solution

RODINE

Keeps the acid from eating good metal. Thus it stops waste of both acid and metal. It also prevents over-pickling, eliminates acid fumes, and reduces acid embrittlement.

One result of these advantages is lowered costs; other results are increased tonnage and brighter pickling.

Give us the particulars of your pickling process—the kind of metal, kind of acid used, acid concentration, temperature of bath. We can then suggest the grade of RODINE that will improve your pickling.

Bulletin on Request

AMERICAN CHEMICAL PAINT CO.
DEPT. 310, AMBLER, PENNA.

Detroit, Michigan — Walkerville, Ont.

Crucible's Third Quarter Profit Totals $1,988,854

■ Crucible Steel Co. of America, New York, reported net income for third quarter was $1,988,854 after all charges and allowing for the new tax rate but before provision for excess profits tax. Net profit was equal to $3.55 per outstanding share on the company's new common after provision for dividends on Crucible's new 5 per cent convertible preferred.

Second quarter net was $1,211,727 or $1.78 per share on common under the old capitalization and in accordance with federal taxes in effect that period.

Aggregate indicated net profit for first nine months this year was $4,393,736. Computed on the present share basis, this would be equal to $7.09 per common share.

WOODWARD IRON CO. NETS $1,383,611 IN NINE MONTHS

Woodward Iron Co., Woodward, Ala., reports net profit for nine months ended Sept. 30 was $1,383,611 after depreciation, depletion, interest and normal income taxes but before provision for pending changes in the federal tax law. Earnings for the period were equal to $4.52 per share on par $10 capital stock, and compared with net income of $387,848 or $1.43 per share in the corresponding period last year.

Indicated third quarter net profit, based on first half and nine months' figures, was $552,426. This compared with net income of $150,798 in the period last year and $439,109 in the second quarter, 1940.

Steel Corp. Shipments At Accelerated Rate

■ Although finished steel shipments by the United States Steel Corp. in September, 1,392,838 net tons, were 62,766 tons less than 1,455,604 tons shipped in August, a loss of 4.31 per cent, the average daily rate in September was 58,634 tons, against 53,911 tons in August. There were 27 full working days in August and only 24 in September.

(Inter-company shipments not included)

Net Tons

	1940	1939	1938	1937
Jan.	1,145,592	870,866	570,264	1,268,403
Feb.	1,009,256	747,427	522,395	1,252,845
March	931,905	845,108	627,047	1,563,113
April	907,904	771,752	550,551	1,485,231
May	1,084,057	795,689	509,811	1,443,477
June	1,209,684	807,562	524,994	1,405,078
July	1,296,887	745,364	484,611	1,315,353
Aug.	1,455,604	885,636	615,521	1,225,967
Sept.	1,392,838	1,086,683	635,645	1,161,113
Oct.	.....	1,345,853	730,312	875,972
Nov.	.....	1,406,205	749,328	648,727
Dec.	.....	1,443,969	765,868	539,553
Total, by Months	...	11,752,116	7,286,347	14,184,772
Adjustment		*44,865	†29,159	*87,106
Total	.....	11,707,251	7,315,506	14,097,666

†Increase. *Decrease.

"WITHSTANDS ACTION OF ALL SOLUTIONS"

says satisfied user of

UNICHROME* RACK COATING-W

Satisfied users of "Unichrome" Rack-Coating W* continue to write in praise of this new, superior rack insulating material. Letters like this one:

"The plating rack withstood the action of all solutions so well that we would like you to come here and discuss its ('Unichrome' Rack-Coating W*) further use with us."

or this one

"Unichrome Rack-Coating W* is standing up after eleven months in both the bright nickel and chromium solutions."

Why are users so enthusiastic about "Unichrome" Rack-Coating W*? Because of its unequalled *combination* of advantages:—

1. Withstands boiling cleaners and all plating solutions
2. Tough—withstands wear and tear of handling
3. Contains no ingredients harmful to plating solutions
4. Cuts costs—reduces frequency of recoatings
5. Easy to apply—"dip and force dry" method
6. Light in color—easy to see how well the rack is covered
7. Any part of rack can be recoated without recoating entire rack.

Write for Bulletin No. 20 Containing Complete Information—

Platers without rack coating facilities may have their racks coated with "Unichrome" Rack Coating-W* by Chromium Corporation of America, 4645 West Chicago Avenue, Chicago, Ill.; Belke Manufacturing Company, 947 North Cicero Avenue, Chicago, Ill.; or Lea Manufacturing Co., Waterbury, Conn.

UNITED CHROMIUM
INCORPORATED

51 East 42nd Street, New York, N.Y.
2751 E. Jefferson Ave., Detroit, Mich.
Waterbury, Conn.

*Trade Mark
Reg. U.S. Pat. Off.

CONSTRUCTION and ENTERPRISE

Ohio

AMHERST, O.—Engineering & Materials Co., headed by Edward Morrison, Pearl street, will start construction of first of two factory units early in 1941 for manufacture of hose couplings, at cost of about $12,000. Second unit will follow immediately.

CINCINNATI — Wright Aeronautical Corp., Paterson, N. J., has completed survey of 220-acre site at Lockland, O., and will proceed at once to construct an aircraft engine plant with 25 acres of floor space. Capacity is planned for 1000 engines per month.

CLEVELAND — Clark Controller Co., 1146 East 152nd street, is building brick and steel addition 30 x 158 feet, costing about $10,000, as part of expansion program. J. L. Hunting Co., Ninth-Chester building, is contractor.

CLEVELAND—Jordan Welding & Mfg. Co., 9428 Cassius avenue, William Jordan, president, will build a warehouse addition in about 60 days.

CLEVELAND—I. Schumann & Co., East Fifty-fifth street and Bellford avenue, is building second addition to its foundry, about 6000 square feet. Some additional equipment will be purchased. Isadore Schumann is in charge.

CLEVELAND—Lake Erie Chemical Co., 2200 Scranton road, manufacturer of ordnance materials, is building a one-story addition 56 x 186 feet, to cost $15,000. Bryan C. Goss is president.

CLEVELAND — Westinghouse Electric & Mfg. Co., 1216 West Fifty-eighth street, W. F. White, manager, will utilize site recently bought adjoining its plant for building program costing $750,000. First part of program will involve four buildings costing $500,000 with equipment. Austin Co., 16112 Euclid avenue, will design and construct buildings.

CLEVELAND—Bennett Products Inc. is being organized by C. R. Bennett, 14416 Potomac avenue, and associates, to manufacture several patented mechanical devices. Plant location is being sought.

CLEVELAND—Bannish Rust Proofing Co., Julius Bannish, president, 1381 East Forty-ninth street, will double present manufacturing space by erecting new plant 72 x 100 feet, costing about $12,000. J L. Hunting Co., Ninth-Chester building, is building plant.

CUYAHOGA FALLS, O.—Emery Machine Co., 1783 Front street, is building a plant addition 40 x 80 feet. Construction is by J. W. Egan & Sons, 700 Wellesley avenue, Akron, O.

DAYTON, O.—Frigidaire division, General Motors Corp., 300 Taylor street, will build a four-story, 150 x 230-foot factory and elevator plant and a two-story top addition to its present building. Plans are by Schenk & Williams, 1406 Third National Bank building, Dayton.

GREENWICH, O. — Kitchen Katchall Corp., L. B. Myerson, president, will increase output on completion of 30 x 80-foot addition for manufacturing and office purposes. Company manufactures machine for removing grease from spun aluminum.

■ **Additional Construction and Enterprise leads may be found in the list of Shapes Pending on page 260 and Reinforcing Bars Pending on page 263 of this issue.**

The first requisite of a welding goggle is that it screen out dangerous infra-red and ultra-violet rays. Our Arc-Ban welding goggles—because they have Bausch & Lomb welding lenses—do that as nearly perfectly as possible.

Ventilation must be provided, yet all side light must be excluded. Our new welding shield does just that.

In addition our welding goggles fit comfortably and give long and satisfactory service.

Send for our new catalog illustrating our complete line.

GREATER *Protection* AND *Comfort*

KIMBALL SAFETY PRODUCTS CO.
7314 Wade Park Avenue • Cleveland, Ohio

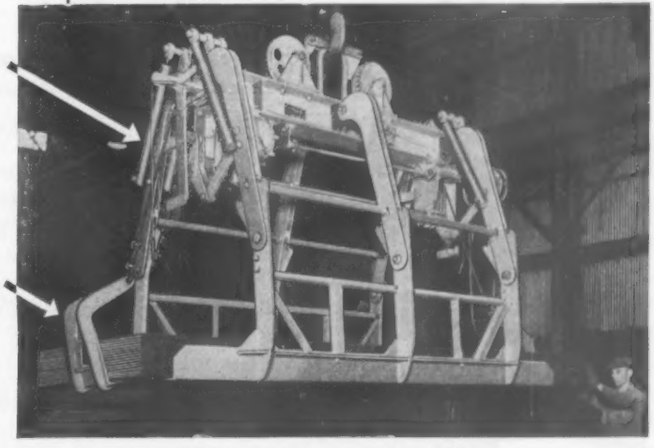
● This new type C-F SHEET LIFTER is like a giant hand for handling steel sheets in bundles and packs up to 20 tons or larger.

These compression spring cylinders provide *double* the speed in opening the jaws with less effort—in fact with "one-man" control.

These new style, instantly adjustable end hooks prevent sagging on overhanging sheets and stop "bellying" of wide stock in handling.

Sheet Steel LIFTING under "one-man" control.....

Safe lifting with end control. Safe handling of valuable stock. Economical operation and wide utility are the features of C-F SHEET LIFTERS. Get complete information about these 2 to 20 ton capacity units adjustable to handling stock from 12 to 72" wide. Send coupon today.



CULLEN-FRIESTEDT CO.
1308 S. KILBOURN AVE., CHICAGO, ILL.
Please send descriptive literature S.L. 18 to
Firm_____
Title_____
Address_____

TOLEDO, O.—General Metal Mfg. Co., has been incorporated with 3750 shares no par value, to manufacture metal products, by Richard D. Logan and associates.

VANDALIA, O.—Aeroproducts division, General Motors Corp., 228 East First street, Dayton, O., will let contract soon for a one-story 250 x 600-foot plant addition and a two-story 100 x 200-foot office building. Argonaut Realty Corp., R-308 General Motors Research building, Detroit, is engineer.

New York

BUFFALO—Curtiss Aeroplane division, Curtiss Wright Corp., Vulcan and Kenmore streets, Buffalo, will build a 600 x 1400-foot manufacturing building, 100 x 900-foot engineering building and 50 x 450-foot office building at Tonawanda, N. Y., to cost about $18,000,000. Albert Kahn Inc., New Center building, Detroit, is architect.

MEDINA, N. Y.—Village board has approved a $135,000 bond issue for a sewage disposal plant on Glenwood Lake, near Gulf street. William S. Lozier, 10 Gibbs street, Rochester, N. Y., is engineer.

NIAGARA FALLS, N. Y.—Bell Aircraft Corp., L. D. Bell, president, 2000 Elmwood avenue, will build an aircraft manufacturing addition 40 x 400 x 600 feet, costing over $100,000. General contract has been awarded to Austin Co., 16112 Euclid avenue, Cleveland.

UTICA, N. Y.—Savage Arms Corp. plans plant expansion for production of machine guns for the government, at cost of $17,600,000, including equipment.

New Jersey

FAIRLAWN, N. J.—Wright Aeronautical Corp., 1120 East Nineteenth street, Paterson, N. J., will build a one-story brick foundry on River road. General contract has been given to Mahoney-Troast Construction Co., 657 Main avenue, Passaic, N. J. Plans are by Albert Kahn Inc., New Center building, Detroit.

KENVIL, N. J.—Hercules Powder Co., 900 Market street, Wilmington, Del., will rebuild various powder plant buildings recently burned, at cost of $2,000,000.

Pennsylvania

MARCUS HOOK, PA. — Congoleum Nairn Inc., 195 Belgrove Drive, Kearny, N. J., has let general contract for plant additions to cost about $100,000 to W. W. Lindsey Co. Inc., Harrison building, Philadelphia.

MILTON, PA.—American Car & Foundry Co., C. J. Hardy, president, 30 Church street, New York, will build a one-story 240-foot extension south of present plant and a new office building, total cost over $100,000. J. A. V. Schreckenbach, vice president, care owner, is in charge of construction.

PHILADELPHIA — Henry Disston & Son, Unruh and Milnor streets, has let general contract for 187 x 375-foot plant addition to Barclay White Co., 22 North Thirty-sixth street, to cost about $250,000.

Michigan

DETROIT—Eureka Tool & Die Co. will build a new manufacturing building on Grinnell avenue. Lyndon, Smith & Winn, Highland Park, Mich., are architects.

DETROIT—DeLuxe Die Works will build a manufacturing building 80 x 215 feet on Hoover road, to cost $44,000.

DETROIT—National Twist Drill & Tool Co. has started construction of a plant at Rochester, Mich. Austin Co., Cleveland, is general contractor.

DETROIT — David-Ludwig Co., 2701 Twenty-third street, has been incorporated with $19,000 capital to do industrial sheet metal work, by William A. David, 16128 Wark avenue, Detroit.

DETROIT—Silica Sand Co. Inc. has been incorporated with $200,000 capital to mine and process minerals by Leroy M. Hull, 3434 National Bank building, Detroit.

DETROIT—Motex Metal Process Corp., 2273 West Jefferson avenue, has been incorporated with $25,000 capital to manufacture metal products and chemicals, by Ben Rhodes, 746 Collingwood avenue, Detroit.

COMSTOCK, MICH.—Consumers' Power Co., Jackson, Mich., will build a power plant addition to house a 50,000-kilowatt generator.

LAPEER, MICH.—Winn Mfg. Co. has been incorporated to manufacture automobile trailers and parts, capital $50,000 and 50,000 shares no par value, by E. T. White, 237 North Main street, Lapeer, Mich.

OXFORD, MICH. — Master Machine Works is having plans prepared by Ward & Baumgartner, Pontiac, Mich., for an addition to its plant.

Illinois

AURORA, ILL.—Lyon Metal Products

3-WAY VALVES
FOR OPEN HEARTH FURNACES
By NICHOLSON

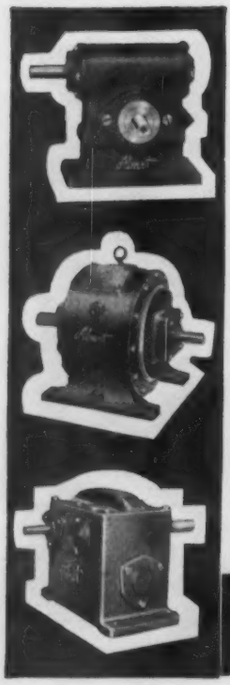
It answers a long-felt need among open hearth operators, because it alternates the flow of oil and steam to the oil burners on the furnaces without showing signs of leakage or wear. For use on air, steam, water or oil up to 300 lb. pressures, this valve can't be surpassed. Our catalog No. 140 carries concise descriptions of this and other valves: foot, solenoid and motor operated. Catalog on request.

PRESSURE-TIGHT SERVICE AT LOW COST

The Nicholson lever-operated style J valve for air or oil pressures up to 125 lbs. was introduced to meet the demand for a low-priced valve. Least expensive of the Nicholson valves, it gives the same trouble-free service that the larger and more expensive valves do. It, too, is described in our catalog No. 140.

OTHER NICHOLSON PRODUCTS:
Nicholson welded floats, piston and weight operated traps. Flexible couplings, expanding mandrels, arbor presses, compression shaft couplings, steam eliminators and separators. Compressed air traps.

W. H. NICHOLSON & COMPANY
177 OREGON ST., WILKES-BARRE, PA.



Abart
SPEED REDUCERS
A Type and Size for Practically Every Purpose

Here is a line of speed reducers that puts new life into machinery—a line that delivers a smooth, steady flow of power at all times. The Abart Speed Reducer Catalog lists types and sizes (many carried in stock for prompt delivery) that you can use for trouble-free and economical operation. Send for this catalog now.

GEARS: All types and materials. No stocks. Cut to B/P or specifications. Accurate, high quality. Quick delivery. Let us quote.

Abart GEAR AND MACHINE CO.
MANUFACTURERS OF
Speed Reducers & Gears
4825 WEST 16TH ST. CHICAGO, ILLINOIS

Co., 321 North Madison street, manufacturer of steel shelving and similar products, is building a one-story addition with 14,000 square feet floor space, costing about $20,000. Carl Linder, Aurora, is engineer.

CHICAGO—Acme Paper Box Co., 2427 West Fourteenth street, is about to place contracts for a one-story addition covering 30,000 square feet, north of newly acquired 70,000-square foot building at State and Sixtieth streets, to which company will move about Jan. 1.

CHICAGO—American Stock Gear Co., 646 West Washington street, has let general contract for a one-story plant at 6665 West Sixty-fifth street to Clearing Industrial district, 6455 South Central avenue, to cost about $90,000.

CHICAGO—Libert Smelting & Refining Co., 1925 North Wendell avenue, is rebuilding a one-story plant, general contract to Zirken Construction Co., 4430 West Roosevelt road, to cost about $40,000.

CHICAGO—Reuter Bros. Iron Works, 2600 West 111th street, has built a one-story addition to its steel fabricating plant, costing $30,000.

CHICAGO — Central Screw Co., 3501 Shields avenue, manufacturer of screws, bolts, nuts and rivets, will build a one-story plant addition with 25,000 square feet floor space, to cost about $50,000.

CHICAGO—Boyer Schultz Corp., 2110 West Walnut street, is building plant addition costing $20,000. Company manufactures tools, dies and special machinery.

CHICAGO — Thompson-Bremer & Co., 1640 West Hubbard street, manufacturer of lock washers, plans a $20,000 plant addition. Melvin A. Nelson is architect.

CHICAGO HEIGHTS, ILL.—Columbia Tool Steel Co., Fourteenth street, is building an addition with 5000 square feet floor space, costing $10,000 to increase warehouse facilities.

CHICAGO — Reliance Pattern Works, 4417 West Carroll street, is building a one story plant at 4352 West Chicago avenue at cost of about $10,000.

ROCKFORD, ILL.—Rockford Machine Tool Co., 2450 Kishwaukee street, will build a one-story warehouse addition.

SPRINGFIELD, ILL.—Baker Mfg. Co., builder of snow plows and road-building machinery, has an expansion program under way to double manufacturing facilities, at cost of about $100,000. Includes new building and remodeling of present office and factory building.

Indiana

ANDERSON, IND.—Delco Remy division, General Motors Corp., will build a foundry for production of aluminum castings for Allison Engineering Co., Indianapolis. The latter is building aircraft engines. A. J. Glaser, Muncie, Ind., has the building contract.

ELWOOD, IND. — Board of public works, G. W. Bonham, mayor, city hall, has preliminary plans for a sewage treatment plant and sewer system to cost about $450,000. Russell B. Moore & Co., 930 Indiana Pythian building, Indianapolis, engineers.

INDIANAPOLIS — Radio Corp. of America Inc., 30 Rockefeller Plaza, New York, J. N. Smith, resident vice president, is building four additions to its branch plant here, at St. Clair street and Belt railway, for manufacture of radio apparatus, to cost about $450,000.

RICHMOND, IND. — Board of public works, city hall, plans extensions and improvements for the municipal power plant, including a 15,000-kilowatt turbine generator set and accessories, to cost about $825,000. John W. Mueller, 42 South Ninth street, is consulting engineer.

SOUTH BEND, IND.—Bendix Aviation Corp. plans extensions to increase its production of airplane parts by 25 per cent, at cost of $1,500,000.

Tennessee

CHATTANOOGA, TENN. — Tennessee

NEW
CONTINUOUS AUTOMATIC
STRAIGHTENING, SIZING and POLISHING Bar, Tube and Wire Machines

Combines all the necessary features of Speed, Precision, Capacity and Safety... Steel rolls set in Medart-Timken Bearings... Driving gears completely enclosed... Also Continuous Automatic Centerless Round Bar and Tube Turners, built in several types.

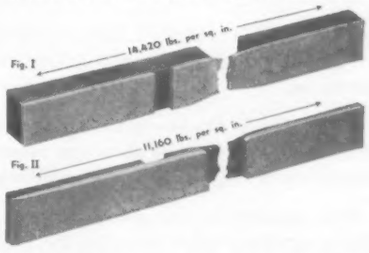
THE MEDART CO. • 3520 De Kalb St., St. Louis, Mo.

MEDART

NO QUESTION MARKS
When You Fabricate..

JESSOP SILVER-PLY Stainless-Clad STEEL

These test specimens of SILVER-PLY had portions of the stainless cladding and the mild steel backing cut away on opposite sides so that one square inch would be in shear during the tensile tests, thus giving the actual lbs. per sq. in. pulling force. Note that in both cases the strength of union between the component parts is greater than the load necessary to break the cladding (Fig. I) or the mild steel backing (Fig. II).



Tensile test specimens of Type 304 SILVER-PLY Stainless-Clad Steel: Fig. I, 20% clad; Fig. II, 50% clad. These tests were conducted by an independent laboratory.

Severe tests such as these prove the reliability of SILVER-PLY Stainless-Clad Steel—both when fabricated and when in service. SILVER-PLY offers the high corrosion resistance of solid stainless while saving up to 45% in material costs. For complete information address: JESSOP STEEL CO., 584 Green St., Washington, Pa. ESTABLISHED 1901.

"JESSOP SETS STANDARDS IN FINE QUALITY STEELS"

JESSOP STEEL CO. MADE IN AMERICA FINE JESSOP STEELS WASHINGTON, PA.

Jessop Steels of America
CARBON- HIGH SPEED- SPECIAL ALLOY
STAINLESS and COMPOSITE STEELS

Gas & Transmission Co., Curtis B. Dahl, president, 401 Chattanooga Bank building, has received approval of federal power commission for proposed natural gas line from the Rhodesia fields in northwest Louisiana to Asheville, N. C. Line now being surveyed.

West Virginia

HUNTINGTON, W. VA.—International Nickel Co., 67 Wall street, New York, is building an extension to its merchant mill, 50 x 80 feet, to cost $22,000.

Missouri

ST. LOUIS—John C. Kupferle Foundry Co., 2822 North First street, has revised plans by William Wedemeyer & Son, Wainright building, for a brick plant addition, for which bids will be called soon.

Minnesota

ALEXANDRIA, MINN.—Douglas county power co-operative, Clifford R. Hove, superintendent, has given contract to Acme Construction Co. at $263,038 for construction of 420 miles rural transmission lines. General Engineering Corp., 2944 Cedar avenue, Minneapolis, is consulting engineer.

RUSHFORD, MINN.—REA has allotted $185,000 to Tri-County electric co-operative, Earl J. Kjos, manager, for 236 miles of rural transmission lines to serve 547 customers.

Texas

HOUSTON, TEX.—Eastern States Petroleum Co. Inc., First National Bank building, has bought 20-acre site on Houston ship channel for tank farm and wharves.

HOUSTON, TEX.—Missouri Bridge & Iron Co., Fullerton building, St. Louis, has plans completed for steel fabricating plant on LaPorte highway, to cost about $85,000.

Kansas

COUNCIL GROVE, KANS.—REA has allotted $222,000 to Flint Hills rural electric co-operative, W. M. Leslie, superintendent, for 295 miles of rural transmission lines to serve 680 customers. (Noted August 5).

GREAT BEND, KANS.—REA has allotted $236,000 to Central Kansas electric co-operative, W. D. Essmiller, president, for 312 miles rural transmission lines to serve 648 customers.

WELLINGTON, KANS.—REA has allotted $286,000 to Sumner-Cowley electric co-operative, C. L. Weber, superintendent, for construction of 334 miles of rural transmission lines. (Noted August 19).

WICHITA, KANS.—Boeing Airplane Co., 200 West Michigan avenue, Seattle, will build two plant buildings, 100 x 1000 and 200 x 1000 feet, at cost of about $1,500,000.

South Dakota

BRITTON, S. DAK.—City council is considering proposition to erect municipal electric light plant to cost $150,000 to $180,000. No definite action has been taken.

NEWELL, S. DAK.—REA has allotted $157,000 to Butte electric association, Clarke Spencer, president, for 196 miles rural transmission lines to serve 405 customers.

Iowa

IDA GROVE, IOWA—Ida county rural electric co-operative, Charles L. Pullen, superintendent, will ask bids soon on construction of 145 miles of rural transmission lines, to serve 350 customers. K. R. Brown, 802 Valley Bank building, Des Moines, Iowa, is consulting engineer.

OSAGE, IOWA—Voters have approved a bond issue of $325,000 to finance construction of an electric light and power plant. G. E. Swanson is mayor. Hubbard Engineering Co., 80 East Jackson boulevard, is consulting engineer.

WEBSTER CITY, IOWA—City, C. C. McCarthy, city manager, is considering installation of steam generating unit at the municipal electric light plant, to cost about $45,000.

Wyoming

BASIN, WYO.—City, Ralph L. Johnson, clerk, is taking bids to Oct. 17 for furnishing and installing 250-KVA 2400-volt alternator and exciter and natural gas operated engine and auxiliaries, at estimated cost of $25,000. Dan J. McQuaid, 614 Cooper building, Denver, is consulting engineer.

Washington

BREMERTON, WASH.—Kerr Motors Inc. has taken bids on a 70 x 90-foot addition to its plant, on plans by A. M. Young, architect, Seattle, to cost about $20,000.

SPOKANE, WASH.—WPA allotment of $299,000 has been made for development of Sunset airport, covering 1000 acres, for the war department.

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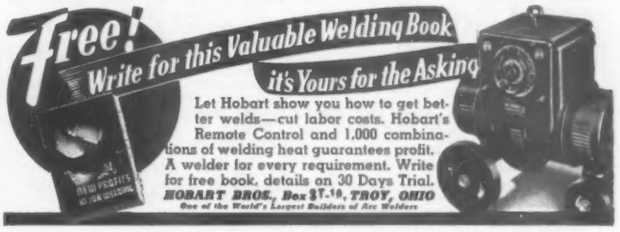

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Johnson Bronze Co., 550 So. Mill St., New Castle, Pa.
Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.
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Link-Belt Co., 2410 W. 18th St., Chicago, Ill.

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National Carbide Corp., 60 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

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Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

CARS (Cinder Pot)
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Dump)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Pressed Steel Car Co., (Koppel Div.) Koppers Bldg., Pittsburgh, Pa.

CARS (Industrial and Mining)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Differential Steel Car Co., Findlay, O.
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CARS (Scale)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

CASTING WASHER EQUIPMENT
Pangborn Corp., Hagerstown, Md.

CASTINGS (Acid Resisting)
American Brake Shoe & Fdry Co., The, 230 Park Ave.,
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.
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Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
International Nickel Co., Inc., The, 67 Wall St., New York City.
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National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, O.

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Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
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Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Damascus Steel Casting Co., New Brighton, Pa.
Electro-Alloys Co., The, Elyria, O.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
National-Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, O., Springfield, O.
Pittsburgh Rolls, Div. of Blaw-Knox Co., Pittsburgh, Pa.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
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Lawrence Copper & Bronze, Bessemer Bldg., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
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National-Erie Corp., Erie, Pa.
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Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

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American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Canton Pattern & Mfg. Co., The, Andrews Pl. S.W., Canton, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Columbia Steel Co., San Francisco, Calif.
Erie Foundry Co., Erie, Pa.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Forest City Foundries Co., The, 2500 W. 27th St., Cleveland, O.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Roll & Foundry Co., The, Avonmore, Pa.
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Electro-Alloys Co., The, Elyria, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Alloy Steel Co., Blawnox, Pa.
Shenango Penn Mold Co., Dover, O.

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Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Lake City Malleable Co., 5026 Lakeside Ave., Cleveland, O.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

CASTINGS (Manganese Steel)
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CASTINGS (Steel) (*Also Stainless)
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Bethlehem Steel Co., Bethlehem, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
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Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
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Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Steel Founders' Society of America, 920 Midland Bldg., Cleveland, O
Strong Steel Fdry. Co., Hertel & Norris Ave., Buffalo, N. Y.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Steel Casting Co., 62nd and Butler Sts., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
West Steel Casting Co., 805 E. 70th St., Cleveland, O.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

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American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Shenango Penn Mold Co., Dover, O.

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Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Cadman, A. W., Mfg. Co., 2816 Smallman St., Pittsburgh, Pa.

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Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.

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Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

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Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E., Pennsalt Cleaner Div., Philadelphia, Pa.

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Columbia Steel Co., San Francisco, Calif.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Koppers Co., Gas & Coke Div., 300 Koppers Bldg., Pittsburgh, Pa.
Koppers Coal Co., 300 Koppers Bldg., Pittsburgh, Pa.
New England Coal & Coke Co., Boston, Mass.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

COAL, COKE, ORE AND ASH HANDLING MACHINERY
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Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
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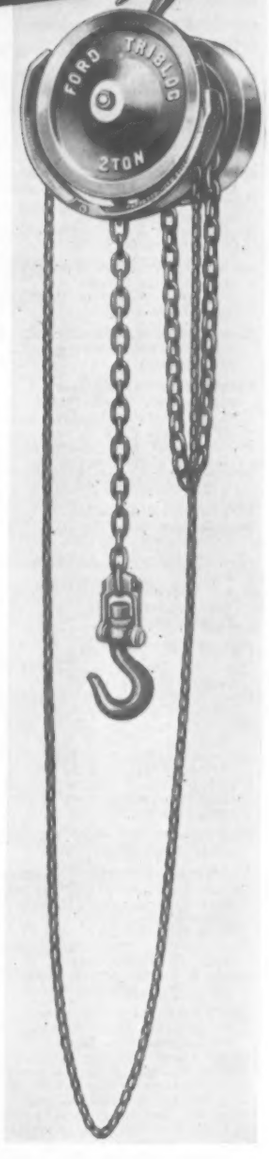

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COMBUSTION CONTROLS
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Morgan Construction Co., Worcester, Mass.
Norton Company, Worcester, Mass.

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COMPENSATORS (Automatic)
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Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
General Electric Co., Schenectady, N. Y.
Worthington Pump & Machinery Corp., Harrison, N. J.

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CONDENSERS (Surface, Barometric, Multi-Jet)
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Western Gas Div., Koppers Co., Fort Wayne, Ind.
Worthington Pump & Machinery Corp., Harrison, N. J.

CONDUITS (Electric)
Youngstown Sheet & Tube Co., The, Youngstown, O.

CONDUITS (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

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Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

CONTRACTORS—See ENGINEERS AND CONTRACTORS

CONTROL SYSTEMS (Automatic)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

CONTROLLERS (Electric)
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.

CONTROLS (Combustion)—See COMBUSTION CONTROLS

CONTROLS (Temperature)
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Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

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Cyclone Fence Co., Waukegan, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

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Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

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Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Overhead Trolley)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Link-Belt Co., 300 W. Pershing Road, Chicago, Ill.

CONVEYORS (Roller—Power and Gravity)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Mathews Conveyer Co., 114 Tenth St., Ellwood City, Pa.

CONVEYORS (Vibratory)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

COPPER (Phosphorized)
National Bearing Metals Corp., 928 Shore Ave., Pittsburgh, Pa.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

COPPERING COMPOUND
American Chemical Paint Co., Dept. 310, Ambler, Pa.

CORRESPONDENCE COURSES
International Correspondence Schools, Box 9378, Scranton, Pa.

COTTER PINS
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 416 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

COUNTERBORES
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

COUPLERS
Hunt, C. B., & Son, Salem, O.

COUPLINGS (Flexible)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
American Flexible Coupling Co., 18th & Pittsburgh Aves., Erie, Pa.
Baldwin-Duckworth Div. of Chain Belt Co., 326 Plainfield St., Springfield, Mass.
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn.
322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Lovejoy Flexible Coupling Co., 4973 W. Lake St., Chicago, Ill.
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.
Poole Fdy. & Mach. Co., Woodberry St., Baltimore, Md.
Waldron, John, Corp., New Brunswick, N. J.

COUPLINGS (Pipe)
Bethlehem Steel Co., Bethlehem, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Republic Steel Corp., Dept. ST, Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

CRANES, BRIDGE (Ore and Coal Handling)
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.
Industrial Brownhoist Corp., Bay City, Mich.

CRANES (Charging)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Crawler, Erection)
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Electric)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Gantry)
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Gasoline and Diesel)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Hand)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Jib)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

CRANES (Locomotive)
Cullen-Friestedt Co., 1308 So. Kilbourn Ave., Chicago, Ill.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.
Ohio Locomotive Crane Co., Bucyrus, O.

CRANES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

CRANES (Traveling)
Industrial Equipment Corp., Pittsburgh, Pa.
Wright Mfg. Div. of American Chain & Cable Co., Inc., York, Pa.

CRANK SHAFTS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

CRUSHERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

CUSHIONS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

CUTTERS (Die Sinking & End Milling)
Brown & Sharpe Mfg. Co., Providence, R. I.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CUTTERS (Gang Slitter)
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

CUTTING AND WELDING—See WELDING

CUTTING OILS—See OILS (Cutting)

CYLINDERS (Air or Hydraulic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.

CYLINDERS (Pressure)
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DEGREASERS
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

DEOXIDIZERS
Vanadium Corp. of America, 420 Lexington Ave., New York City

DIE BLOCKS
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

DIE HEADS
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Inc., Waynesboro, Pa.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

DIE-SINKING MACHINES
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.

DIES (Cast)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.

DIES (Punching, Stamping, Blanking)
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

DOLOMITE—FLUX AND REFRACTORIES
Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

DOORS & SHUTTERS (Steel, Fire, and Rolling)
Kinnear Mfg. Co., 1780-1800 Fields Ave., Columbus, O.

DRAGLINES (Crawler)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

DRAFT GAGES (Indicating, Recording)
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

DRAFTING ROOM EQUIPMENT
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

DRILL HEADS (Multiple)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

DRILL RODS—See RODS (Drill)

DRILLING MACHINES (Radial)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

DRILLS (Twist)—See TWIST DRILLS

DRIVES (Chain)
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.
Link-Belt Co., 220 S. Belmont Ave., Indianapolis, Ind.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

DRIVES (Cut Herringbone Gear)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

DRIVES (Multi-V-Belt)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

DRIVES (Reciprocating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

DRUMS (Steel)
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

DRYERS (Compressed Air)
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

DRYERS (Rotary)
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

DUST ARRESTING EQUIPMENT
Pangborn Corp., Hagerstown, Md.
Ruemelin Mfg. Co., 3882 N. Palmer St., Milwaukee, Wis.

ECONOMIC SERVICE
Brookmire Corp., 551 Fifth Ave., New York City.

ECONOMIZERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

ELECTRIC WELDING—See WELDING

ELECTRIC WIRING—See WIRE AND CABLE

ELECTRICAL EQUIPMENT
Allen-Bradley Co., 1320 So. Second St., Milwaukee, Wis.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.

ELECTRODES (Carbon and Graphite)
National Carbon Co., W. 117th St. at Madison Ave., Cleveland, O.

ELEVATING AND CONVEYING MACHINERY—See CONVEYORS

ENGINEERS AND CONTRACTORS
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Morgan Engineering Co., The, Alliance, O.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

ENGINEERS (Consulting)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
Loftus Engineering Corp., 509 Oliver Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Wean Engineering Co., Warren, O.

ENGINES (Diesel)
Cooper-Bessemer Corp., Mt. Vernon, O.

ENGINES (Gas, Oil)
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Worthington Pump & Machinery Corp., Harrison, N. J.

ENGINES (Steam)
Oil Well Supply Co., Dallas, Texas.

FANS (Crane Cab)
Graybar Electric Co., 420 Lexington Ave., New York City.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

EXCAVATORS
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

FANS (Exhaust Ventilating)
Graybar Electric Co., 420 Lexington Ave., New York City.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (High Temperature)
Garden City Fan Co., 332 S. Michigan Ave., Chicago, Ill.

FANS (Portable)
Graybar Electric Co., 420 Lexington Ave., New York City.
Perkins, B. F., & Son, Inc., Holyoke, Mass.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FANS (Wall)
Graybar Electric Co., 420 Lexington Ave., New York City.
Truflo Fan Co., 600 Mercer St., Harmony, Pa.

FENCE (Chain Link)
Cyclone Fence Co., Waukegan, Ill.
Page Steel & Wire Div. of American Chain & Cable Co., Inc., Monessen, Pa.

FENCING (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

FERROALLOY (Briquets)
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

FERROALLOYS
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROCHROME
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank & Co., Inc. Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROMANGANESE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FERROPHOSPHORUS
Samuel, Frank, & Co., Inc. Harrison Bldg., Philadelphia, Pa.

FERROSILICON
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison, Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROSILICON (Aluminum)
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROTITANIUM
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FERROVANADIUM
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

FILES AND RASPS
Simonds Saw & Steel Co., Fitchburg, Mass.

FILING CABINETS (Blueprint, Drawing and Tracing)
Pease, C. F., Co., The, 2688 W. Irving Park Blvd., Chicago, Ill.

FILTER CLOTH (Asbestos)
Johns-Manville Corp., 22 E. 40th St., New York City.

FIRE CLAY—See REFRACTORIES

FIRE DOORS & SHUTTERS—See DOORS & SHUTTERS

FITTINGS (Electric Steel)
Reading-Pratt & Cady Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.

FLAME HARDENING
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., 30 E. 42nd St., New York City.
National-Erie Corp., Erie, Pa.

FLANGES (Welded Steel)
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.

FLOOR RESURFACING
Flexrock Co., 2330 Manning St., Philadelphia, Pa.

FLOORING (Monolithic)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

FLOORING (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

FLUE DUST CONDITIONERS
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

FLUE GAS ANALYZERS
Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

FLUORSPAR
Hillside Fluor Spar Mines, 38 S. Dearborn St., Chicago, Ill.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.

FLUXES (Soldering, Welding & Tinning)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

FORGING BILLETS—See BILLETS

FORGING MACHINERY
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.

FORGING ROLLS
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.

FORGINGS (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

FORGINGS (Drop) (*Also Stainless)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
*Bethlehem Steel Co., Bethlehem, Pa.
Oil Well Supply Co., Dallas, Texas.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Hollow Bored)
Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

FORGINGS (Iron and Steel) (*Also Stainless)
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
*Atlas Drop Forge Co., Lansing, Mich.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
*Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Oil Well Supply Co., Dallas, Texas.
Standard Steel Works Co., Paschall P. O., Philadelphia, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

FORGINGS (Upset)
American Forge Div. of The American Brake Shoe & Fdry Co., 2621 So. Hoyne Ave., Chicago, Ill.
Atlas Drop Forge Co., Lansing, Mich.
Bethlehem Steel Co., Bethlehem, Pa.

FROGS AND SWITCHES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.

FURNACE INSULATION—See INSULATION

FURNACES (Blast)
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.

FURNACES (Brazing)
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Electric Heating)
Ajax Electrothermic Corp., Ajax Park Trenton, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

FURNACES (Electric Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
General Electric Co., Schenectady, N. Y.
Pittsburgh Lectromelt Furnace Corp., P. O. Box 1257, Pittsburgh, Pa.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.

FURNACES (Forging)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Galvanizing)
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

FURNACES (Gas or Oil)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Heat Treating, Annealing, Carburizing, Hardening, Tempering)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
American Gas Furnace Co., Elizabeth, N. J.
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Carborundum Co., The, Perth Amboy, N. J.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.
Holden, A. F., Co., 200 Winchester Ave., New Haven, Conn.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Laboratory)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hevi Duty Electric Co., 4100 W. Highland Blvd., Milwaukee, Wis.

FURNACES (Non-Ferrous Melting)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.

FURNACES (Open Hearth)
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Lindemuth, Lewis B., 140 Cedar St., New York City.
McKee, Arthur G., & Co., 2422 Euclid Ave., Cleveland, O.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.

FURNACES (Recuperative)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J. Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Rivet Heating)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

FURNACES (Sheet and Tin Mill)
Electric Furnace Co., The, Salem, O.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Wean Engineering Co., Warren, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

FURNACES (Steel Mill)
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Electric Furnace Co., The, Salem, O.
General Electric Co., Schenectady, N. Y.
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.
Salem Engineering Co., 714 So. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.
Swindell-Dressler Corp., P. O. Box 1888, Pittsburgh, Pa.
Wellman Engineering Co., The, 7016 Central Ave., Cleveland, O.
Wilson, Lee, Engineering Co., 1370 Blount St., Cleveland, O.

GAGE BLOCKS
Dearborn Gage Co., 22036 Beech St., Dearborn, Mich.

GAGES
Brown & Sharpe Mfg. Co., Providence, R. I.
Greenfield Tap & Die Corp., Greenfield, Mass.
Sheffield Gage Corp., 1523 E. Third St., Dayton, O.

GAGES (Indicating and Recording)
General Electric Co., Schenectady, N. Y.
Sheffield Gage Corp., 1523 E. Third St., Dayton, O.

GALVANIZING (Hot Dip)
Acme Galvanizing, Inc., Milwaukee, Wis.
Acme Steel & Malleable Iron Works, Buffalo, N. Y.
American Hot Dip Galvanizers Assoc., Inc., 903 American Bank Bldg., Pittsburgh, Pa.
American Tinning & Galvanizing Co., Erie, Pa.
Atlantic Steel Co., Atlanta, Ga.
Buffalo Galvanizing & Tinning Works, Inc., Buffalo, N. Y.
Cattie, Jos. P., & Bros., Gaul and Liberty Sts., Philadelphia, Pa.
Commercial Metals Treating, Inc., Toledo, O.
Diamond Expansion Bolt Co., Inc., Garwood, N. J.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Equipment Steel Div., of Union Asbestos & Rubber Co., Blue Island, Ill.
Fanner Mfg. Co., The, Cleveland, O.
John Finn Metal Works, San Francisco, Calif.
Gregory, Thomas, Galvanizing Works, Maspeth, N. Y.
Hanlon-Gregory Galvanizing Co., 5515 Butler St., Pittsburgh, Pa.
Hubbard & Co., Oakland, Calif.
Independent Galvanizing Co., Newark, N. J.
International Derrick & Equipment Co., Columbus, O.
Joslyn Co. of California, Los Angeles, Calif.
Joslyn Mfg. & Supply Co., Chicago, Ill.
Koven, L. O., & Bro., Inc., Jersey City, N. J.
Lehigh Structural Steel Co., Allentown, Pa.
Lewis Bolt & Nut Co., Minneapolis, Minn.
Missouri Rolling Mill Corp., St. Louis, Mo.
National Telephone Supply Co., The, Cleveland, O.
Penn Galvanizing Co., Philadelphia, Pa.
Riverside Foundry & Galvanizing Co., Kalamazoo, Mich.
San Francisco Galvanizing Works, San Francisco, Calif.
Sanitary Tinning Co., The, Cleveland, O.
Standard Galvanizing Co., Chicago, Ill.
Wilcox, Crittenden & Co., Inc., Middletown, Conn.
Witt Cornice Co., The, Cincinnati, O.

GALVANIZING PLANTS FOR SHEETS
Erie Foundry Co., Erie, Pa.
Wean Engineering Co., Warren, O.

GAS HOLDERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GAS PRODUCER PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

GAS RECOVERY COKE OVEN AND GAS PLANTS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

GAS SCRUBBERS
Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Brassert, H. A., & Co., 1st National Bank Bldg., Pittsburgh, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

GASKETS (Asbestos, Metal or Rubber)
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

GEAR BLANKS
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
National-Erie Corp., Erie, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Waldron, John, Corp., New Brunswick, N. J.

GEAR MACHINERY (Generating)
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

GEAR MACHINERY (Lapping, Finishing, Checking)
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

GEARS (Non-Metallic)
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.

GEARS (Steel Laminated)
Waldron, John, Corp., New Brunswick, N. J.

GEARS (Worm)
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.

GEARS AND GEAR CUTTING
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
General Electric Co., Schenectady, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
National-Erie Corp., Erie, Pa.
Pittsburgh Gear & Machine Co., 2680-2700 Smallman St., Pittsburgh, Pa.
Simonds Gear & Mfg. Co., 25th St., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

GENERATING SETS
Electric Generator & Motor Co., 4519 Hamilton Ave., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GENERATORS (Acetylene—Portable and Stationary)
Linde Air Products Co., The, 30 E. 42nd St., New York City.

GENERATORS (Electric)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

GRABS—FOR SHEETS, COILS, INGOTS
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

GRATING
Blaw-Knox Co., Blawnox, Pa.
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.
Tri-Lok Co., 5515 Butler St., Pittsburgh, Pa.

WHERE-TO-BUY

GREASE (Lubricating)—See LUBRICANTS (Industrial)

GREASE RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.

GRINDERS (Foundry Core)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

GRINDERS (Pedestal, High Speed)
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.

GRINDERS (Precision Thread)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

GRINDERS (Single Slide Internal)
Bryant Chucking Grinder Co., Springfield, Vt.

GRINDERS (Surface)
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., Worcester, Mass.
Norton Company, Worcester, Mass.

GRINDERS (Swing Frame)
Fox Grinders, Inc., Oliver Bldg., Pittsburgh, Pa.

GRINDING COMPOUNDS
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.

GRINDING DISCS
Abrasive Products Co., 511 Pearl St., So. Braintree, Mass.

GRINDING MACHINES (Automotive Reconditioning)
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Centerless, Internal and External)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Chucking)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Heald Machine Co., Worcester, Mass.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Crank Pin, Cam, Piston & Valve Face)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Company, Worcester, Mass.

GRINDING MACHINES (Oscillating)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.

GRINDING MACHINES (Plain and Universal)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Landis Tool Company, Waynesboro, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Roll)
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Landis Tool Co., Waynesboro, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Norton Co., Worcester, Mass.

GRINDING MACHINES (Rotary Surface)
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Heald Machine Co., Worcester, Mass.

GRINDING MACHINES (Tool and Cutter)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

GRINDING MACHINES (Swing Frame)
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.

GRINDING (Shear Knife)
American Shear Knife Co., 3rd & Ann Sts., Homestead, Pa.

GRINDING WHEELS
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Co., Worcester, Mass.

GRINDING WHEELS (Segmental)
Abrasive Co., Tacony & Fraley Sts., Philadelphia, Pa.
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Norton Company, Worcester, Mass.

GUIDE SHOES
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUIDES (Mill)
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
National-Erie Corp., Erie, Pa.
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

GUNS (Blast Furnace Mud)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

GUNS (Steam, Hydraulic, Electric)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

HAMMER BUSHINGS
Steel Conversion & Supply Co., P. O. Box 537 (Castle Shannon), Pittsburgh, Pa.

HAMMERS (Drop)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St. Buffalo, N. Y.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HAMMERS (Steam)
Chambersburg Engineering Co., Chambersburg, Pa.
Erie Foundry Co., Erie, Pa.
Industrial Brownhoist Corp., Bay City, Mich.
Morgan Engineering Co., The, Alliance, O.

HANGERS
Grinnell Co., Inc., Providence, R. I.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HANGERS (Shaft)
Bantam Bearings Corp., South Bend, Ind.
Fafnir Bearing Co., New Britain, Conn.
Hyatt Bearings Division, General Motors Sales Corp., Harrison, N. J.
New Departure Div., General Motors Corp., Bristol, Conn.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

HEADING MACHINERY
Ajax Mfg. Co., 1441 Chardon Rd., Cleveland, O.
National Machinery Co., Tiffin, O.

HEATERS (Air)
Airtherm Manufacturing Co., 726 S. Spring Ave., St. Louis, Mo.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

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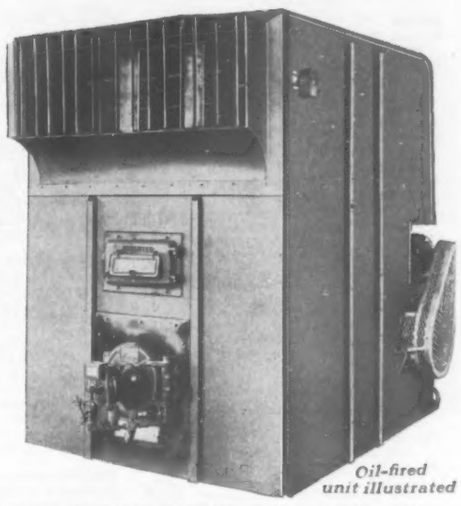

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Commercial Metals Treating, Inc., Toledo, O.

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Pangborn Corp., Hagerstown, Md.

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American Chain & Cable Co., Inc., Bridgeport, Conn.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

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Ford Chain Block Div. of American Chain & Cable Co., Inc., 2nd & Diamond Sts., Philadelphia, Pa.
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Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

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American Engineering Co., 2484 Aramingo Ave., Philadelphia, Pa.
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, 2609 Atwater St., Detroit Mich.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 406 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Wright Mfg. Div. of American Chain & Cable Co. Inc., York, Pa.
Yale & Towne Mfg. Co. 4530 Tacony St., Philadelphia, Pa.

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Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
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Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

HOISTS (Pneumatic)
Curtis Pneumatic Machinery Co., 1996 Kienlen Ave., St. Louis, Mo.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.

HOOKS (Chain)
American Chain & Cable Co., Inc., Bridgeport, Conn.

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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

HOSE (Flexible Metal)
American Metal Hose Branch of American Brass Co., The, Waterbury, Conn.

HOSE (Rubber)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

HUMIDIFIERS (Industrial)
Grinnell Co., Inc., Providence, R. I.

HYDRAULIC MACHINERY
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

HYDRAULIC PRESSES—See PRESSES (Hydraulic)

HYDRAULIC UNITS
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

INDICATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
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Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
Shenango-Penn Mold Co., Oliver Bldg., Pittsburgh, Pa.
Valley Mould & Iron Corp., Hubbard, O.

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American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.

INJECTORS (Lead)
Dietzel Lead Burning Co., Coraopolis, Pa.

INSTRUMENTS (Electric Indicating and Recording)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

INSULATING BLOCK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING BRICK
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

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Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

INSULATING POWDER AND CEMENT
Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Armstrong Cork Co., 985 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.

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Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Johns-Manville Corp., 22 E. 40th St., New York City.

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Ryerson, Jos. T., & Son Co., 16th & Rockwell Sts., Chicago, Ill.

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Alan Wood Steel Co., Conshohocken, Pa.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Youngstown Sheet & Tube Co., The, Youngstown, O.

JIGS AND FIXTURES
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.

KETTLES (Galvanizing)
Petroleum Iron Works Co., Sharon, Pa.

KEYS (Machine or Woodruff)
Moltrup Steel Products Co., Beaver Falls, Pa.

KILNS (Rotary Sintering)
Smidth, F. L., & Co., 225 Broadway, New York City.

KNIVES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cowles Tool Co., 2086 W. 110th St., Cleveland, O.

LABORATORY WARE
Norton Company, Worcester, Mass.

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Hollands Mfg. Co., 342-352 E. 18th St., Erie, Pa.
Petroleum Iron Works Co., Sharon, Pa.

LAMPS (Industrial)
General Electric Co., Dept. 166-S-J, Nela Park, Cleveland, O.

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Cincinnati Milling Machine and Cincinnati Grinders, Inc., Oakley Sta., Cincinnati, O.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
Norton Company, Worcester, Mass.

LARRIES (Coal)
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Differential Steel Car Co., Findlay, O.

LATHE DOGS (Drop Forged)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

LATHES
Jones & Lamson Machine Co., Springfield, Vt.
LeBlond, R. K., Machine Tool Co., Dept. J-11, 2694 Madison Rd., Cincinnati, O.
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 563 E. Madison St., South Bend, Ind.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

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Brown & Sharpe Mfg. Co., Providence, R. I.
Jones & Lamson Machine Co., Springfield, Vt.
Monarch Machine Tool Co., Sidney, O.

LATHES (Engine)
Monarch Machine Tool Co., Sidney, O.
South Bend Lathe Works, 863 E. Madison St., South Bend, Ind.

LATHES (Roll Turning)
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LATHES (Railroad Car & Driving Wheel)
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

LATHES (Turret)
Brown & Sharpe Mfg. Co., Providence, R. I.
Bullard Company, The, Bridgeport, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., 5701 Carnegie Ave., Cleveland, O.

LEAD (Chemical, Corroding, Desilvered)
St. Joseph Lead Co., 250 Park Ave., New York City.

LEAD (Tellurium)
National Lead Co. 111 Broadway, New York City.

LEAD WORK
Dietzel Lead Burning Co., Coraopolis, Pa.

LEVELING MACHINES
Erie Foundry Co., Erie, Pa.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
McKay Machine Co., Youngstown, O.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

LIFT TRUCKS—See TRUCKS (Lift)

LIFTERS (Rubber Vacuum)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

LIFTING MAGNETS—See MAGNETS (Lifting)

LIGHTING (Industrial)
General Electric Co., Dept. 166-S-J, Nela Park, Cleveland, O.
Graybar Electric Co., 420 Lexington Ave., New York City.

LINERS (Pump and Cylinder)
Shenango-Penn Mold Co., Dover, O.

LOCOMOTIVE CRANES—See CRANES (Locomotive)

LOCOMOTIVES (Diesel-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Diesel Mechanical)
Plymouth Locomotive Works, Div. Fate-Root-Heath Co., Plymouth, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Electric Trolley)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Gasoline Mechanical)
Differential Steel Car Co., Findlay, O.
Whitcomb Locomotive Co., Rochelle, Ill.

LOCOMOTIVES (Oil-Electric)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Differential Steel Car Co., Findlay, O.

LOCOMOTIVES (Storage Battery)
Atlas Car & Mfg Co., The, 1140 Ivanhoe Rd., Cleveland, O.
General Electric Co., Schenectady, N. Y.
Whitcomb Locomotive Co., Rochelle, Ill.

LUBRICANTS (Industrial)
American Lanolin Corp., Railroad St., Lawrence, Mass.
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
New York & New Jersey Lubricant Co., 292 Madison Ave., New York City.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

LUBRICATING SYSTEMS
Farval Corp., The, 3270 E. 80th St., Cleveland, O.

MACHINE WORK
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Hyde Park Foundry & Machine Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.

MACHINERY (Second Hand)
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

MACHINERY (Special)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Barnes, W. F. & John, Co., 201 So. Water St., Rockford, Ill.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Brosius, Edgar E., Inc., Sharpsburgh Branch, Pittsburgh, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Columbus Die, Tool & Mach. Co., 955 Cleveland Ave., Columbus, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.
National-Erie Corp., Erie, Pa.
National Roll & Fdry. Co., The, Avonmore, Pa.
Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y.
Oil Well Supply Co., Dallas, Texas.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

MAGNESIA (Electrically Fused)
Norton Co., Worcester, Mass.

MAGNETIC SEPARATORS—See SEPARATORS (Magnetic)

MAGNETS (Lifting)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MAGNETS (Separating)
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

MANDRELS (Expanding)
Nicholson, W. H., & Co., 177 Oregon St., Wilkes-Barre, Pa.

MANGANESE METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.

MANGANESE ORE
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

MANIPULATORS
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Morgan Engineering Co., The, Alliance, O.

MARKING DEVICES
Helmer-Staley, Inc. 321 W. Huron St., Chicago, Ill.

METAL (Perforated)—See PERFORATED METAL

METAL BLAST ABRASIVES (Shot and Grit)
American Foundry Equipment Co., The, 509 So. Byrkit St., Mishawaka, Ind.
Pangborn Corp., Hagerstown, Md.
Pittsburgh Crushed Steel Co., 4839 Harrison St., Pittsburgh Pa.

METAL CLEANERS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Pennsylvania Salt Mfg. Co., Dept. E. Pennsalt Cleaner Div., Philadelphia, Pa.

METAL FINISHES
American Nickeloid Co., 1310 Second St., Peru, Ill.

METAL SPECIALTIES AND PARTS—See STAMPINGS

METAL STAMPINGS—See STAMPINGS

METALS (Nonferrous)
American Brass Co., The, Waterbury, Conn.
International Nickel Co., Inc., The, 67 Wall St., New York City.
Titanium Alloy Mfg. Co., The, Niagara Falls, N. Y.

MICROMETERS
Brown & Sharpe Mfg. Co., Providence, R. I.

MILLING CUTTERS
Brown & Sharpe Mfg. Co., Providence, R. I.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

MILLING MACHINES
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati Milling Machine and Cincinnati Grinders Inc., Oakley Sta., Cincinnati, O.
Kearney & Trecker Corp., 5926 National Ave., Milwaukee, Wis.
National Broach & Machine Co., 5300 St. Jean, Detroit, Mich.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

MILLING MACHINES (Milling and Centering Combined)
Jones & Lamson Machine Co., Springfield, Vt.

MILLS (Blooming, Universal, Plate, Sheet, Tin, Bar, Strip, Etc.)—See ROLLING MILL EQUIPMENT

MOLDING MACHINERY (Foundry)
Milwaukee Foundry Equipment Co., 3233 W. Pierce St., Milwaukee, Wis.

MOLDS (Ingot)—See INGOT MOLDS

MOLYBDENUM
Climax Molybdenum Co., 500 Fifth Ave., New York City.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

MONEL METAL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

MONORAIL SYSTEMS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.

MOTORS (Electric)
Allis-Chalmers Mfg. Co. Milwaukee, Wis.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Graybar Electric Co., 420 Lexington Ave., New York City.
Harnischfeger Corp., 4411 W. National Ave., Milwaukee, Wis.
Lincoln Electric Co., The, Cleveland, O., Dept. Y-25.
Reliance Electric & Eng. Co., 1081 Ivanhoe Rd., Cleveland, O.
Sawyer Electrical Mfg. Co., 5715 Leneve St., Los Angeles, Cal.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.
U. S. Electrical Motors, Inc., 80—34th St., Brooklyn, N. Y.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

MUCK BAR
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

NAILS
(*Also Stainless)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Pittsburgh Steel Co., 1653 Grant Bldg, Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Youngstown Sheet & Tube Co., The, Youngstown, O.

NAILS (Coated and Galvanized)
Wickwire Brothers, 189 Main St., Cortland, N. Y.

NAILS (Special Only—All Metals)
Townsend Co., New Brighton, Pa.

NICKEL (All Commercial Forms)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL (Shot)
International Nickel Co., Inc., The, 67 Wall St., New York City.

NICKEL STEEL (Cold Drawn)
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Republic Steel Co., Dept. ST, Cleveland, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

NOZZLES (Blasting)
Pangborn Corporation, Hagerstown, Md.

NUTS
(*Also Stainless)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Elastic Stop Nut Corp., 2340 A Vauxhall Rd., Union, N. J.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Tinnerman Products, Inc., 2039 Fulton Rd., Cleveland, O.

NUTS (Castellated)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Machine Screw)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.

NUTS (Self Locking)
Elastic Stop Nut Corp., 2340 A Vauxhall Rd., Union, N. J.

NUTS (Semi-Finished)
Bethlehem Steel Co., Bethlehem, Pa.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

NUTS (Wing)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

OIL RETAINERS AND SEALS
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

OILS (Cutting)
Gulf Oil Corp. of Penna., Gulf Refining Co., 3813 Gulf Bldg., Pittsburgh, Pa.
Penola, Inc., 34th & Smallman Sts., Pittsburgh, Pa.
Pure Oil Co., The, 35 E. Wacker Dr., Chicago, Ill.
Shell Oil Co., Inc., 50 W. 50th St., New York City.
Socony-Vacuum Oil Co., Inc., 26 Broadway, New York City.
Sun Oil Co., 1608 Walnut St., Philadelphia, Pa.
Tide Water Associated Oil Co., 17 Battery Place, New York City.

OILS (Lubricating)—See LUBRICANTS (Industrial)

OILS (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

OPEN-HEARTH FURNACES—See FURNACES (Open-Hearth)

OVENS (Annealing, Japanning, Tempering)
Hagan, Geo. J., Co., 2400 E. Carson St., Pittsburgh, Pa.
Stewart Furnace Div., Chicago Flexible Shaft Co., 1106 So. Central Ave., Chicago, Ill.

OVENS (Coke, By-Product Recovery)
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

OVENS (Core and Mold)
Pennsylvania Industrial Engineers, 2413 W. Magnolia St., Pittsburgh, Pa.

OXY-ACETYLENE WELDING AND CUTTING—See WELDING

OXYGEN IN CYLINDERS
Air Reduction Sales Co., 60 E. 42nd St., New York City.
Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

PACKING (Asbestos or Rubber)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.
Johns-Manville Corp., 22 E. 40th St., New York City.

PACKINGS—MECHANICAL LEATHER (Cup, U-Cup, Flange and Vees)
Chicago Rawhide Mfg. Co., 1308 Elston Ave., Chicago, Ill.
Garlock Packing Co., The, S 3-40, Palmyra, N. Y.

PAINT (Alkali Resisting)
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PAINT (Aluminum)
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Heat Resisting)
American Chemical Paint Co., Dept. 310, Ambler, Pa.

PAINT (Industrial)
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.

PAINT (Marking)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Rust Preventive)
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

PAINT (Stick Form)
Helmer-Staley, Inc., 321 W. Huron St., Chicago, Ill.

PARTS (Precision)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PATTERN EQUIPMENT (Wood or Metal)
Wellman Bronze & Aluminum Co., The, 6017 Superior Ave., Cleveland, O.

PERFORATED METAL
Chicago Perforating Co., 2443 W. 24th Pl., Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

PHENOL RECOVERY PLANTS
Koppers Co., Engineering and Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.

PICKLING COMPOUNDS
American Chemical Paint Co., Dept. 310, Ambler, Pa.
Parkin, Wm. M., Co., The, 1005 Highland Bldg., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING CRATES
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING EQUIPMENT
International Nickel Co., The, 67 Wall St., New York City.
Youngstown Welding & Engineering Co., The, Youngstown, O.

PICKLING MACHINERY
Erie Foundry Co., Erie, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Wean Engineering Co., Warren, O.

PICKLING TANK LININGS
Atlas Mineral Products Co., of Pa., Mertztown, Pa.
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

PICKLING TANKS—See TANKS (Pickling)

PIERCER POINTS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIG IRON
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Brooke, E. & G., Iron Co., Birdsboro, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Cleveland-Cliffs Iron Co., Union Commerce Bldg., Cleveland, O.
Hanna Furnace Corp., The, Ecorse, Detroit, Mich.
Jackson Iron & Steel Co., Jackson, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Samuel, Frank & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Shenango Furnace Co., Oliver Bldg., Pittsburgh, Pa.
Snyder, W. P., & Co., Oliver Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

PILING (Iron and Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 South Dearborn St., Chicago, Ill.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Co., Dept. ST, Cleveland, O.

PILING (Pressure-Treated Wood)
Wood Preserving Corp., The, 300 Koppers Bldg., Pittsburgh, Pa.

PILLOW BLOCKS (Roller Bearing)
Link-Belt Co., 519 N. Holmes Ave., Indianapolis, Ind.
Shafer Bearing Corp., 35 E. Wacker Drive, Chicago, Ill.

PILLOW BOXES
SKF Industries, Inc., Front St. and Erie Ave., Philadelphia, Pa.

PINIONS (Mill)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O.
National-Erie Corp., Erie, Pa.
Simonds Gear & Mfg. Co., The, 25th St., Pittsburgh, Pa.
United Engineering & Foundry Co., First National Bank Bldg., Pittsburgh, Pa.

PINS (Case Hardened or Heat Treated)
Erie Bolt & Nut Co., Liberty Ave. at W. 12th St., Erie, Pa.

PINS (Clevis)
Townsend Co., New Brighton, Pa.

PINS (Taper)
Moltrup Steel Products Co., Beaver Falls, Pa.

PIPE (Brass, Bronze, Copper)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.
Shenango-Penn Mold Co., Dover, O.

PIPE (Square and Rectangular)
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE (Steel)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Babcock & Wilcox Tube Co., The, Beaver Falls, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Columbia Steel Co., San Francisco, Calif.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Western Gas Div., Koppers Co., Fort Wayne, Ind.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PIPE BALLS
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

PIPE BENDING
Crane Co., 836 So. Michigan Ave., Chicago, Ill.

PIPE CUTTING AND THREADING MACHINERY
Landis Machine Co., Inc., Waynesboro, Pa.

PIPE FITTINGS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Crane Co., 836 So. Michigan Ave., Chicago, Ill.
Grinnell Co., Inc., Providence, R. I.
Oil Well Supply Co., Dallas, Texas.
Worthington Pump & Machy. Corp., Harrison, N. J.

PIPE LINES (Riveted and Welded)
Bethlehem Steel Co., Bethlehem, Pa.
Petroleum Iron Works Co., Sharon, Pa.

PIPE MILL MACHINERY
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE ROLLS (Magnetic)
Dings Magnetic Separator Co., 675 Smith St., Milwaukee, Wis.

PIPE STRAIGHTENING MACHINERY
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PIPE TOOLS
Greenfield Tap & Die Corp., Greenfield, Mass.

PIPING CONTRACTORS
Grinnell Co., Inc., Providence, R. I.
Power Piping Co., Beaver and Western Ave., Pittsburgh, Pa.

PISTON RINGS
American Hammered Piston Ring Div., Koppers Co., Baltimore, Md.

PISTON RODS
Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Heppenstall Co., 47th and Hatfield Sts., Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.

PLANERS AND SHAPERS
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Sellers, Wm., & Co., Inc., 1622 Hamilton St., Philadelphia, Pa.

PLATE CASTORS
Hyatt Bearings Div., General Motors Sales Corp., Harrison, N. J.

PLATES (Sheared or Universal) (*Also Stainless)
*Alan Wood Steel Co., Conshohocken, Pa.
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
*Bethlehem Steel Co., Bethlehem, Pa.
*Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
*Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Worth Steel Co., Claymont, Del.
Youngstown Sheet & Tube Co., The, Youngstown, O.

PLATES (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

PLATES (Steel—Floor)—See FLOORING (Steel)

PLATES (Terne and Tin)—See TIN PLATE

PLUGS (Expansion)
Hubbard, M. D., Spring Co., 416 Central Ave., Pontiac, Mich.

PLUGS (Rolling Mill)
Youngstown Alloy Casting Corp., 103 E. Indianola Ave., Youngstown, O.

POLES (Tubular Steel)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

POLISHING MACHINERY (Tube and Bar)
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.

POTS (Case Hardening)
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

POTS (Melting)
American Brake Shoe & Fdry. Co., The, 230 Park Ave., New York City.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.

POWER UNITS (Gasoline, Electric for Industrial Trucks)
Ready-Power Co., The, 3826 Grand River Ave., Detroit, Mich.

PREHEATERS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRESSED METAL PARTS
American Forge Div. of American Brake Shoe & Fdry. Co., The, 2621 S. Hoyne Ave., Chicago, Ill.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Stanley Works, The, Pressed Metal Div., New Britain, Conn.

PRESSES
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Waterbury Farrell Fdry. & Mach. Co., Waterbury, Conn.

PRESSES (Bending)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Extrusion)
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

PRESSES (Forging)
Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Erie Foundry Co., Erie, Pa.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National Machinery Co., The, Tiffin, O.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

PRESSES (Forming and Braking)
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Crane & Engineering Co., The Steelweld Machinery Div., Wickliffe, O.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Hydraulic)
Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Chambersburg Engineering Co., Chambersburg, Pa.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Erie Foundry Co., Erie, Pa.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
National-Erie Corp., Erie, Pa.
Progressive Welder Co., 3031 E. Outer Drive, Detroit, Mich.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

WHERE-TO-BUY

PRESSES (Pneumatic)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Punching, Drawing, Coining, Blanking, etc.)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
Progressive Welder Co., 3031 E. Outer Drive., Detroit, Mich.
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Riveting)
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PRESSES (Scrap Bundling and Baling)
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.

PRESSES (Stamping)
Zeh & Hahnemann Co., 56 Avenue A, Newark, N. J.

PRESSES (Welding)—See WELDERS

PRESSES, BRIQUETING (Turnings & Borings)
Milwaukee Foundry Equipment Co., 3238 W. Pierce St., Milwaukee, Wis.

PRESSURE VESSELS
Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.

PRODUCER GAS SYSTEMS—See GAS PRODUCER PLANTS

PUG MILLS (For Blast Furnaces and Sintering Plants)
Bailey, Wm. M., Co., 702 Magee Bldg., Pittsburgh, Pa.

PULLEYS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.

PULVERIZERS
American Pulverizer Co., 1539 Macklind Ave., St. Louis, Mo.

PUMP HOUSES
Dravo Corp. (Contracting Div.), Neville Island, Pittsburgh, Pa.

PUMPS
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Mesta Machine Co., P. O. Box 1466, Pittsburgh, Pa.
Oil Well Supply Co., Dallas, Texas.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Boiler Feed)
Worthington Pump & Machinery Corp., Harrison, N. J.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Centrifugal)
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.

PUMPS (Fuel Injection)
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.

PUMPS (Hydraulic)
Brown & Sharpe Mfg. Co., Providence, R. I.
Elmes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.
Worthington Pump & Machinery Corp., Harrison, N. J.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

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Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Rotary)
Brown & Sharpe Mfg. Co., Providence, R. I.
Weinman Pump & Supply Co., The, 210 Blvd. of the Allies, Pittsburgh, Pa.

PUMPS (Vacuum)
Worthington Pump & Machinery Corp., Harrison, N. J.

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Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

PUNCHING AND SHEARING MACHINERY
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Chambersburg Engineering Co., Chambersburg, Pa.
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry Co., E. Chicago, Ind.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Waterbury Farrell Fdry. & Mach. Co., Waterbury, Conn.

PYROMETER TUBES
Norton Company, Worcester, Mass.

PYROMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

RAIL BREAKERS
National Roll & Foundry Co., The, Avonmore, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

RAILS (New and Relaying)
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

RAILS (Steel)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Ryerson, Jos. T. & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

REAMERS
Blanchard Machine Co., The, 64 State St., Cambridge, Mass.
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.
Greenfield Tap & Die Corp., Greenfield, Mass.

REBUILT EQUIPMENT
Marr-Galbreath Machinery Co., 53 Water St., Pittsburgh, Pa.
West Penn Machinery Co., 1208 House Bldg., Pittsburgh, Pa.

RECEIVERS
Petroleum Iron Works Co., Sharon, Pa.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.

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Hays Corp., The, 960 Eighth Ave., Michigan City, Ind.

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National-Erie Corp., Erie, Pa.
Sturtevant, B. F., Co., Hyde Park, Boston, Mass.

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Basic Dolomite, Inc., Hanna Bldg., Cleveland, O.

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Babcock & Wilcox Co., The, Refractories Div., 85 Liberty St., New York City.
Eureka Fire Brick Co., 1100 B. F. Jones Law Bldg., Pittsburgh, Pa.
Globe Brick Co., The, East Liverpool, O.
Illinois Clay Products Co., 214 Barber Bldg., Joliet, Ill.

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Ajax Electrothermic Corp., Ajax Park, Trenton, N. J.
Carborundum Co., The, Perth Amboy, N. J.
Norton Company, Worcester, Mass.

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Carborundum Co., The, Perth Amboy, N. J.
Norton Co., Worcester, Mass.

REFRACTORY CONCRETE
Atlas Lumnite Cement Co., Dept. S-7, Chrysler Bldg., New York City.
Johns-Manville Corp., 22 E. 40th St., New York City.

REGULATORS (Pressure)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

REGULATORS (Temperature)
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.
Leeds & Northrup Co., 4957 Stenton Ave., Philadelphia, Pa.

REINFORCEMENT FABRIC (Electric Welded)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

RESISTORS (Edgewound)
Clark Controller Co., The, 1146 E. 152nd St., Cleveland, O.

RESISTORS (Graphite Disc)
Allen-Bradley Co., 1320 So. 2nd St., Milwaukee, Wis.

RHEOSTATS (Plating)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

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Bay City Forge Co., W. 19th and Cranberry Sts., Erie, Pa.
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King Fifth Wheel Co., 5027 Beaumont Ave., Philadelphia, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.

RINGS (Weldless) (*Also Stainless)
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Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

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Chambersburg Engineering Co., Chambersburg, Pa.
Shuster, F. B., Co., The, New Haven, Conn.
Tomkins-Johnson Co., 611 N. Mechanic St., Jackson, Mich.
Wood, R. D., Co., 400 Chestnut St., Philadelphia, Pa.

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Bethlehem Steel Co., Bethlehem, Pa.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
*Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
*Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
*Townsend Co., New Brighton, Pa.

RODS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Bridgeport Brass Co., Bridgeport, Conn.

RODS (Drill)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.

RODS (Rounds, Flats and Shapes) (*Also Stainless)
*Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
*Copperweld Steel Co., Warren, O.
*Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Washburn Wire Co., Phillipsdale, R. I.
Youngstown Sheet & Tube Co., The, Youngstown, O.

RODS (Steel and Iron)
Firth-Sterling Steel Co., McKeesport, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.

RODS (Welding)—See WELDING RODS

RODS (Wire)—See WIRE PRODUCTS

ROLL COOLERS (Internal, Water)
Hunt, C. B., & Son, Salem, O.

ROLLER LEVELERS (Backed-up)
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

ROLL FORMING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

ROLLING DOORS & SHUTTERS—See DOORS AND SHUTTERS

ROLLING MILL BEARINGS—See BEARINGS (Rolling Mill)

ROLLING MILL EQUIPMENT
Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Mackintosh-Hemphill Co., 9th and Bingham Sts., Pittsburgh, Pa.
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Morgan Construction Co., Worcester, Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Foundry Co., The, Avonmore, Pa.
Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.
Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.
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Schloemann Engineering Corp., Empire Bldg., Pittsburgh, Pa.

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Baldwin Southwark Div., Baldwin Locomotive Works, Philadelphia, Pa.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.

ROLLS (Rubber Covered)
Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

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Birdsboro Steel Fdry. & Mach. Co., Birdsboro, Pa.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
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Ohio Steel Fdry. Co., Lima, O. Springfield, O.
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United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

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Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Johns-Manville Corp., 22 E. 40th St., New York City.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
New Jersey Zinc Co., 160 Front St., New York City.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Sons, Inc., 16th and Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Carey, Philip, Co., The, Dept. 71, Lockland, Cincinnati, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

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Lowman-Shields Rubber Co., 209 First Ave., Pittsburgh, Pa.

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Alrose Chemical Co., 80 Clifford St., Providence, R. I.
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American Lanolin Corp., Railroad St., Lawrence, Mass.
Flood Co., The, 6217 Carnegie Ave., Cleveland, O.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.
Wayne Chemical Products Co., 9502 Copeland St., Detroit, Mich.

RUST PROOFING PROCESS
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Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Koppers Co., Tar & Chemical Div., 300 Koppers Bldg., Pittsburgh, Pa.

SAFE ENDS (Boiler Tube)
National Tube Co., Frick Bldg., Pittsburgh, Pa.

SAFETY DEVICES
Kimball Safety Products Co., 7314 Wade Park Ave., Cleveland, O.

SAFETY DEVICES (Electric)
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SALT TABLETS
Morton Salt Co., 310 So. Michigan Ave., Chicago, Ill.

SAND CONDITIONING AND PREPARING MACHINERY
Link-Belt Co., 300 W. Pershing Rd., Chicago, Ill.

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Ajax Manufacturing Co., 1441 Chardon Rd., Cleveland, O.
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Morgan Engineering Co., The, Alliance, O.
United Engineering & Fdry Co., First National Bank Bldg., Pittsburgh, Pa.

SAWING MACHINES (Contour)
Continental Machines, Inc., 1324 So. Washington Ave., Minneapolis, Minn.

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Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Hack)
Armstrong-Blum Mfg. Co., 5700 Bloomingdale Ave., Chicago, Ill.
Simonds Saw and Steel Co., Fitchburg, Mass.

SAWS (Hot and Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.

SAWS (Inserted Tooth, Cold)
Huther Bros. Saw & Mfg. Co., 1190 University Ave., Rochester, N. Y.
Simonds Saw & Steel Co., Fitchburg, Mass.

SAWS (Metal Cutting)
Brown & Sharpe Mfg. Co., Providence, R. I.
Simonds Saw & Steel Co., Fitchburg, Mass.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SCAFFOLDING (Tubular)
Dravo Corp. (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

SCALES
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCALES (Monorail)
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
Fairbanks, Morse & Co., Dept. 96, 600 So. Michigan Ave., Chicago, Ill.
Kron Co., The, Bridgeport, Conn.
Shepard Niles Crane & Hoist Corp., 358 Schuyler Ave., Montour Falls, N. Y.
Toledo Scale Co., 3216 Monroe St., Toledo, O.

SCHOOLS
International Correspondence Schools, Box 9378, Scranton, Pa.

SCRAP BALING PRESSES—See BALING PRESSES

SCREENS AND SIEVES
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.
Chicago Perforating Co., 2443 W. 24th Pl. Chicago, Ill.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.
Koppers Co., Engineering & Construction Div., 901 Koppers Bldg., Pittsburgh, Pa.
Ludlow-Saylor Wire Co., The, Newstead Ave. & Wabash R. R., St. Louis, Mo.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SCREENS (Vibrating)
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SCREW EXTRACTORS
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW MACHINE PRODUCTS
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn
Hindley Mfg. Co., Valley Falls, R. I.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW MACHINES (Automatic, Single and Multiple Spindle)
Brown & Sharpe Mfg. Co., Providence, R. I.
Cone Automatic Machine Co., Windsor, Vt.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREW PLATES
Greenfield Tap & Die Corp., Greenfield, Mass.

SCREW STOCK—See STEEL (Screw Stock)

SCREWS
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Cap, Set, Safety-Set)
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Acme Co., The, 170 E. 131st St., Cleveland, O.

SCREWS (Cold Headed)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Cleveland Cap Screw Co., 2934 E. 79th St., Cleveland, O.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Townsend Co., New Brighton, Pa.

SCREWS (Conveyor)
Lee Spring Co. Inc., 30 Main St., Brooklyn, N. Y.

SCREWS (Drive)
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.
Townsend Co., New Brighton, Pa.

SCREWS (Hardened Self-Tapping)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Machine)
Central Screw Company, 3517 Shields Ave., Chicago, Ill
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.

SCREWS (Machine, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Scovill Mfg. Co., Waterbury, Conn.

SCREWS (Self Locking)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Sheet Metal, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Parker-Kalon Corp., 194-200 Varick St., New York City.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

SCREWS (Socket, Cold Forged)
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Thread-Cutting)
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.

SCREWS (Thumb)
Central Screw Company, 3517 Shields Ave., Chicago, Ill.
Parker-Kalon Corp., 194-200 Varick St., New York City.

SCREWS (Wood, Recessed Head)
American Screw Co., Providence, R. I.
Chandler Products Co., Euclid, O.
Continental Screw Co., New Bedford, Mass.
Corbin Screw Corp., New Britain, Conn.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
National Screw & Mfg. Co., 2440 E. 75th St., Cleveland, O.
Pheoll Mfg. Co., 5700 Roosevelt Rd., Chicago, Ill.

SEAMLESS STEEL TUBING—See TUBES

SEPARATORS (Magnetic)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Dings Magnetic Separator Co., 663 Smith St., Milwaukee, Wis.
Electric Controller & Mfg. Co., The, 2698 E. 79th St., Cleveland, O.
Ohio Electric Mfg. Co., The, 5906 Maurice Ave., Cleveland, O.

SHAFT HANGERS—See HANGERS (Shaft)

SHAFTING
Bliss & Laughlin, Inc., Harvey, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHAKERS
Ajax Flexible Coupling Co., 4 English St., Westfield, N. Y.

SHAPERS
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.

SHAPES (Steel)—See STEEL (Structural)

SHAPES, SPECIAL (Steel)
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Union Drawn Steel Div. Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

SHEAR BLADES
American Shear Knife Co., 3rd and Ann Sts., Homestead, Pa.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.

SHEARS
Beatty Machine & Mfg. Co., 944 150th St., Hammond, Ind.
Bliss, E. W., Co., 53rd St. & 2nd Ave., Brooklyn, N. Y.
Cincinnati Shaper Co., Garrard and Elam Sts., Cincinnati, O.
Cleveland Punch & Shear Works, The, 3917 St. Clair Ave., Cleveland, O.
Continental Roll & Steel Fdry. Co., E. Chicago, Ind.
Haliden Machine Co., The, Thomaston, Conn.
Hannifin Mfg. Co., 621-631 So. Kolmar Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
Lewis Fdry. & Mach. Div. of Blaw-Knox Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.
United Engineering & Fdry. Co., First National Bank Bldg., Pittsburgh, Pa.

SHEET BARS
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEET LIFTERS AND CARRIERS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.
Hyde Park Fdry. & Mach. Co., Hyde Park, Pa.
J-B Engineering Sales Co., 1743 Orange St., New Haven, Conn.

SHEET METAL PRODUCTS—See STAMPINGS

SHEET METAL WORKERS MACHINES
Cincinnati Shaper Co., Elam and Garrard Sts., Cincinnati, O.
Excelsior Tool & Machine Co., Ridge & Jefferson Aves., E. St. Louis, Ill.
Niagara Machine & Tool Works, 637-697 Northland Ave., Buffalo, N. Y.

SHEET STEEL PILING (New and Used)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.

SHEETS (Acid Resisting)
International Nickel Co., Inc., The, 67 Wall St., New York City.

SHEETS (Black)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.

SHEETS (Brass, Bronze, Copper, Nickel Silver, Silicon-Bronze)
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Dept. S-1014, 3830 W. Burnham St., Milwaukee, Wis.
Bridgeport Brass Co., Bridgeport, Conn.

SHEETS (Corrugated)
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Deep Drawing and Stamping)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Electrical)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Galvanized)
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.

SHEETS (Galvanized)—Con.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.
Weirton Steel Co., Weirton, W. Va.

SHEETS (Hot Rolled and Hot Rolled Annealed)
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Long Terne)
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHEETS (Perforated)
Harrington & King Perforating Co., 5634 Fillmore St., Chicago, Ill.

SHEETS (Reinforced)
Erdle Perforating Co., 171 York St., Rochester, N. Y.

SHEETS (Roofing)—See ROOFING AND SIDING

SHEETS (Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Massillon, O.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.

SHEETS (Stainless Clad)
Granite City Steel Co., Granite City, Ill.

SHEETS (Tin)—See TIN PLATE

SHEETS (Tin Mill Black)
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

SHEETS—HIGH FINISH (Automobile, Metal Furniture, Enameling)
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
Andrews Steel Co., The, Newport, Ky.
Apollo Steel Co., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wheeling Steel Corp., Wheeling, W. Va.
Weirton Steel Co., Weirton, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SHOVELS (Power)
Northwest Engineering Co., 28 E. Jackson Blvd., Chicago, Ill.

SIEVES—See SCREENS AND SIEVES

SIGNALING & INTER-COMMUNICATION EQUIPMENT
Graybar Electric Co., 420 Lexington Ave., New York City.

SILICO-MANGANESE
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Ohio Ferro-Alloys Corp., Citizens Bldg., Canton, O.
Samuel, Frank, & Co., Inc., Harrison Bldg., Philadelphia, Pa.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

SILICON METAL AND ALLOYS
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.

SKELP (Steel)
Alan Wood Steel Co., Conshohocken, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Inland Steel Co., 38 S. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

SLAG GRANULATING MACHINES (Blast Furnace and Open Hearth)
Brosius, Edgar E., Inc., Sharpsburg Branch, Pittsburgh, Pa.

SMALL TOOLS
Brown & Sharpe Mfg. Co., Providence, R. I.
Cleveland Twist Drill Co., The, 1242 E. 49th St., Cleveland, O.

SOAKING PITS
Amsler-Morton Co., The, Fulton Bldg., Pittsburgh, Pa.
Criswell, James, Co., Keenan Bldg., Pittsburgh, Pa.
Salem Engineering Co., 714 S. Broadway, Salem, O.
Surface Combustion Corp., 2375 Dorr St., Toledo, O.

SOLDER
Kester Solder Co., 4222 Wrightwood Ave., Chicago, Ill.

SOLENOIDS (Electric)
Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.

SOLVENT (Degreasing)
Detroit Rex Products Co., 13029 Hillview Ave., Detroit, Mich.
Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SPECIAL MACHINERY—See MACHINERY (Special)

SPEED REDUCERS
Abart Gear & Machine Co., 4825 W. 16th St., Chicago, Ill.
Cleveland Worm & Gear Co., 3270 E. 80th St., Cleveland, O.
Farrel-Birmingham Co., Inc., 110 Main St., Ansonia, Conn. 322 Vulcan St., Buffalo, N. Y.
Grant Gear Works, 2nd & B. Sts., Boston, Mass.
Horsburgh & Scott Co., The, 5112 Hamilton Ave., Cleveland, O
James, D. O., Mfg. Co., 1120 W. Monroe St., Chicago, Ill.
Jones, W. A., Fdry. & Mach. Co., 4437 W. Roosevelt Rd., Chicago, Ill.
Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.
New Departure Div., General Motors Corp., Bristol, Conn.

SPELTER (Zinc)
St. Joseph Lead Co., 250 Park Ave., New York City.

SPIEGELEISEN
Electro Metallurgical Sales Corp., 30 E. 42nd St., New York City.
New Jersey Zinc Co., 160 Front St., New York City.
Samuel, Frank, & Co., Inc., The, Harrison Bldg., Philadelphia, Pa.

SPIKES (Screw)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

SPINDLES (Grinding)
Bryant Chucking Grinder Co., Springfield, Vt.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
Heald Machine Co., Worcester, Mass.

SPLICE BARS (Rail)
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

SPRINGS (*Also Stainless)
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
*American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Duer Spring & Mfg. Co., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Hubbard, M. D., Spring Co., 416 Central Ave., Pontiac, Mich.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Standard Steel Works Div. of The Baldwin Locomotive Works, Philadelphia, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.

SPRINGS (Alloy)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Coil and Elliptic)
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.

SPRINGS (Oil Tempered—Flat)
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.

SPRINKLERS (Automatic)
Grinnel Co., Inc., Providence, R. I.

SPROCKETS
Chain Belt Co., 1660 W. Bruce St., Milwaukee, Wis.

SPRUE CUTTERS
Shuster, F. B., Co., The, New Haven, Conn.

STACKS (Steel)—See BRIDGES, ETC.

STAINLESS STEEL—See BARS, SHEETS, STRIP, PLATES, ETC.

STAMPINGS
Accurate Spring Mfg. Co., 3823 W. Lake St., Chicago, Ill.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Barnes, Wallace, Co., The, Div. Associated Spring Corp., Bristol, Conn.
Davis Brake Beam Co., Laurel Ave., & P. R. R., Johnstown, Pa.
Erdle Perforating Co., 171 York St., Rochester, N. Y.
Hubbard, M. D., Spring Co., 414 Central Ave., Pontiac, Mich.
Kirk & Blum Mfg. Co., The, 2838 Spring Grove Ave., Cincinnati, O.
Pressed Steel Tank Co., 1461 So. 66th St., Milwaukee, Wis.
Raymond Mfg. Co., Div. Associated Spring Corp., Corry, Pa.
Shakeproof Lock Washer Co., 2525 N. Keeler Ave., Chicago, Ill.
Stanley Works, The, Bridgeport, Conn. New Britain, Conn.
Toledo Stamping & Mfg. Co., 90 Fearing Blvd., Toledo, O.
Whitehead Stamping Co., 1667 W. Lafayette Blvd., Detroit, Mich.

STAPLES (Wire)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Wickwire Brothers, 189 Main St., Cortland, N. Y.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STARTERS (Electric Motor)
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.

STEEL (Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Columbia Steel Co., San Francisco, Calif.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Heppenstall Co., 47th & Hatfield Sts., Pittsburgh, Pa.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Simonds Saw & Steel Co., Fitchburg, Mass.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Washburn Wire Co., Phillipsdale, R. I.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Alloy, Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.

WHERE-TO-BUY

STEEL (Alloy, Cold Finished)—Con.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Clad—Corrosion Resisting) (*Also Stainless)
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
*Copperweld Steel Co., Warren, O.
*Granite City Steel Co., Granite City, Ill.
Jessop Steel Co., 584 Green St., Washington, Pa.
Superior Steel Corp., Carnegie, Pa.

STEEL (Cold Drawn)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Sutton Engineering Co., Park Bldg., Pittsburgh, Pa.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Cold Finished)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Union Drawn Steel Div. of Republic Steel Corp., Massillon, O.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Wyckoff Drawn Steel Co., First National Bank Bldg., Pittsburgh, Pa.

STEEL (Corrosion Resisting)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (Die)
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (Drill)
Crucible Steel Company of America, 405 Lexington Ave., New York City.

STEEL (Electric)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Copperweld Steel Co., Warren, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
National Forge & Ordnance Co., Irvine, Warren Co., Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

STEEL (High Speed)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Firth-Sterling Steel Co., McKeesport, Pa.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Vanadium-Alloys Steel Co., Latrobe, Pa.

STEEL (High Tensile, Low Alloy)
Alan Wood Steel Co., Conshohocken, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Nitriding)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.

STEEL (Rusless)—See STEEL (Corrosion Resisting)

STEEL (Screw Stock)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Bliss & Laughlin, Inc., Harvey, Ill.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
LaSalle Steel Co., Dept. 10A, P. O. Box 6800-A, Chicago, Ill.
Moltrup Steel Products Co., Beaver Falls, Pa.
Monarch Steel Co., 545 W. McCarty St., Indianapolis, Ind.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
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Youngstown Sheet & Tube Co., The, Youngstown, O.

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American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Fort Pitt Spring Co., P. O. Box 1377, Pittsburgh, Pa.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.

STEEL (Stainless)—See STEEL (Corrosion Resisting)

STEEL (Strip, Copper Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Thomas Steel Co., The, Warren, O

STEEL (Strip, Hot and Cold Rolled) (*Also Stainless)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
*American Rolling Mill Co., The, 340 Curtis St., Middletown, O.
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
American Tube & Stamping Plant, (Stanley Wks.), Bridgeport, Conn.
Andrews Steel Co., The, Newport, Ky.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
*Firth-Sterling Steel Co., McKeesport, Pa.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., 38 So. Dearborn St., Chicago. Ill.
Jessop, Wm., & Sons, Inc., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
*Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Seneca Wire & Mfg. Co., Fostoria, O.
*Stanley Works, The, New Britain, Conn. Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City. Phillipsdale, R. I.
Weirton Steel Co., Weirton, W. Va.
Wickwire Spencer Steel Co., 500 Fifth Ave., New York City.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.

STEEL (Strip, Tin Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Strip, Zinc Coated)
American Steel & Wire Co., Rockefeller Bldg., Cleveland, O.
Thomas Steel Co., The, Warren, O.
Washburn Wire Co., 118th St. & Harlem River, New York City.

STEEL (Structural) (*Also Stainless)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Belmont Iron Works, 22nd St. and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Enterprise Galvanizing Co., 2525 E. Cumberland St., Philadelphia, Pa.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
*Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.
Wisconsin Steel Co., 180 No. Michigan Ave., Chicago, Ill.
Youngstown Sheet & Tube Co., The, Youngstown, O.

STEEL (Tool)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Carpenter Steel Co., 139 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, O.
Crucible Steel Company of America, 405 Lexington Ave., New York City.
Darwin & Milner, Inc., 1260 W. 4th St., Cleveland, O.
Firth-Sterling Steel Co., McKeesport, Pa.
Forgings & Castings Corp., 1350 Jarvis St., Ferndale, Mich.
Jessop, Wm., & Sons Co., 627-629 Sixth Ave., New York City.
Jessop Steel Co., 584 Green St., Washington, Pa.
Latrobe Electric Steel Co., Latrobe, Pa.
Midvale Co., The, Nicetown, Philadelphia, Pa.
National Broach & Mach. Co., 5600 St. Jean St., Detroit, Mich.
Republic Steel Corp., Dept. ST, Cleveland, O.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Vanadium Alloys Steel Co., Latrobe, Pa.

STEEL BUILDINGS—See BRIDGES, BUILDINGS, ETC.

STEEL DOORS & SHUTTERS—See DOORS & SHUTTERS

STEEL FABRICATORS—See BRIDGES, BUILDINGS, ETC.

STEEL FLOATING AND TERMINAL EQUIPMENT
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

STEEL PLATE CONSTRUCTION
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Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Belmont Iron Works, 22nd St., and Washington Ave., Philadelphia, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Federal Shipbuilding & Dry Dock Co., Kearney, N. J.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Petroleum Iron Works Co., Sharon, Pa.
Western Gas Div., Koppers Co., Fort Wayne, Ind.

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Rhoades, R. W., Metaline Co., P. O. Box 1, Long Island City, N. Y.

STORAGE BATTERIES—See BATTERIES (Storage)

STRAIGHTENING MACHINERY
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.
Eimes, Chas. F., Engineering Works, 243 N. Morgan St., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh, Pa.
Lewis Machine Co., 3450 E. 76th St., Cleveland, O.
Logemann Brothers Co., 3126 Burleigh St., Milwaukee, Wis.
Medart Co., The, 3520 de Kalb St., St. Louis, Mo.
Shuster, F. B., Co., The, New Haven, Conn.
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Voss, Edward W., 2882 W. Liberty Ave., Pittsburgh, Pa.

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Pennsylvania Salt Mfg. Co., Dept. E, Pennsalt Cleaner Div., Philadelphia, Pa.

SWAGING MACHINES
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Cutler-Hammer, Inc., 1211 St. Paul Ave., Milwaukee, Wis.
Electric Controller & Mfg. Co., 2698 E. 79th St., Cleveland, O.
General Electric Co., Schenectady, N. Y.
General Electric Co., Dept. 166-S-J, Nela Park, Cleveland, O.
Westinghouse Electric & Mfg. Co., Dept. 7-N, East Pittsburgh, Pa.

TACHOMETERS
Brown Instrument Div. of Minneapolis Honeywell Regulator Co., 4462 Wayne Ave., Philadelphia, Pa.
Foxboro Co., The, 118 Neponset Ave., Foxboro, Mass.

TANK LININGS
Ceilcote Co., 750 Rockefeller Bldg., Cleveland, O.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

TANKS (Pickling)
Atlas Mineral Products Co. of Pa., Mertztown, Pa.
National Carbon Co., W. 117th St. and Madison Ave., Cleveland, O.

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Bartlett-Hayward Div., Koppers Co., Baltimore, Md.
Bethlehem Steel Co., Bethlehem, Pa.
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National Acme Co., The, 170 E. 131st St., Cleveland, O.

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Thompson-Bremer & Co., 1640 W. Hubbard St., Chicago, Ill.

TERNE PLATE—See TIN PLATE

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National Broach & Machine Co., 5600 St. Jean, Detroit, Mich.

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Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Republic Steel Corp., Dept. ST, Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Weirton Steel Co., Weirton, W. Va.

TIN PLATE
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Granite City Steel Co., Granite City, Ill.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Republic Steel Corp., Dept. ST, Cleveland, O.
Weirton Steel Co., Weirton, W. Va.
Wheeling Steel Corp., Wheeling, W. Va.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TIN PLATE MACHINERY
Kemp, C. M., Mfg. Co., 405 E. Oliver St., Baltimore, Md.
Wean Engineering Co., Warren, O.

TITANIUM
Vanadium Corp. of America, 420 Lexington Ave., New York City.

TONGS (Chain Pipe)
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TONGS (Rail Handling)
Cullen-Friestedt Co., 1308 S. Kilbourn Ave., Chicago, Ill.

TOOL BITS (High Speed)
Allegheny Ludlum Steel Corp., Oliver Bldg., Pittsburgh, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Jessop Steel Co., 584 Green St., Washington, Pa.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

TOOL HOLDERS
Williams, J. H., & Co., 400 Vulcan St., Buffalo, N. Y.

TOOLS (Pneumatic)
Cleveland Punch & Shear Works Co., The, 3917 St. Clair Ave., Cleveland, O.

TOOLS (Precision, Lathe, Metal Cutting, etc.)
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Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.
Ex-Cell-O Corp., 1228 Oakman Blvd., Detroit, Mich.
McKenna Metals Co., 200 Lloyd Ave., Latrobe, Pa.

TOOLS (Tantalum Carbide)
Carboloy Co., Inc., The, 11141 E. 8 Mile Rd., Detroit, Mich.

TOOLS (Tipped, Carbide)
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TORCHES AND BURNERS (Acetylene, Blow, Oxy-Acetylene)
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Linde Air Products Co., The, 30 E. 42nd St., New York City.
National Cylinder Gas Co., 205 W. Wacker Drive, Chicago, Ill.

TOWBOATS
Dravo Corp. (Engin'r'g Works Div.), Neville Island, Pittsburgh, Pa.

TOWERS (Transmission)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.

TOWERS (Tubular Hoisting)
Dravo Corp., (Machinery Div.), 300 Penn Ave., Pittsburgh, Pa.

WHERE-TO-BUY

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TRACK ACCESSORIES
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Columbia Steel Co., San Francisco, Calif.
Foster, L. B., Co., Inc., P. O. Box 1647, Pittsburgh, Pa.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.

TRACK BOLTS
Bethlehem Steel Co., Bethlehem, Pa.
Carnegie-Illinois Steel Corp., Pittsburgh-Chicago.
Columbia Steel Co., San Francisco, Calif.
Inland Steel Co., 38 So. Dearborn St., Chicago, Ill.
Lamson & Sessions Co., The, 1971 W. 85th St., Cleveland, O.
Republic Steel Corp., Upson Nut Div., Dept. ST, 1912 Scranton Rd., Cleveland, O.
Tennessee Coal, Iron & Railroad Co., Brown-Marx Bldg., Birmingham, Ala.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TRAILERS (Arch-Girder)
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRAMRAILS
American MonoRail Co., The, 13102 Athens Ave., Cleveland, O.
Cleveland Tramrail Div. of Cleveland Crane & Engineering Co., 1125 Depot St., Wickliffe, O.
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Republic Steel Corp., Dept. ST, Cleveland, O.
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Ford Chain Block Div. American Chain & Cable Co. Inc., 2nd & Diamond Sts., Philadelphia, Pa.
Northern Engineering Works, 2609 Atwater St., Detroit, Mich.
Wright Mfg. Div. of American Chain & Cable Co., Inc. York, Pa.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

TRUCKS AND TRACTORS (Electric Industrial)
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Baker-Raulang Co., The, 2167 W. 25th St., Cleveland, O.
Yale & Towne Mfg. Co., 4530 Tacony St., Philadelphia, Pa.

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TRUCKS (Dump-Industrial)
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TRUCKS (Hydraulic Lift)
Atlas Car & Mfg. Co., The, 1140 Ivanhoe Rd., Cleveland, O.

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Bethlehem Steel Co., Bethlehem, Pa.
Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th and Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

TUBES (Brass, Bronze, Copper, Nickel Silver)
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Bridgeport Brass Co., Bridgeport, Conn.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.

TUBES (High Carbon)
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Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

TUBE WELDING MACHINES
Etna Machine Co., The, 3400 Maplewood Ave., Toledo, O.

TUBING (Alloy Steel) (*Also Stainless)
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Bissett Steel Co., The, 900 E. 67th St., Cleveland, O.
Columbia Steel Co., San Francisco, Calif.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
*National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Timken Roller Bearing Co., The, Steel & Tube Div., Canton, O.

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American Brass Co., The, Waterbury, Conn.
Bundy Tubing Co., 10951 Hern Ave., Detroit, Mich.
Revere Copper & Brass Co. Inc., 230 Park Ave., New York City.
Shenango-Penn Mold Co., Dover, O.

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National Tube Co., Frick Bldg., Pittsburgh, Pa.
Ohio Seamless Tube Co., Shelby, O.
Pittsburgh Steel Co., 1653 Grant Bldg., Pittsburgh, Pa.
Ryerson, Jos. T., & Son, Inc., 16th & Rockwell Sts., Chicago, Ill.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
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Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

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Jones & Laughlin Steel Corp., Jones & Laughlin Bldg., Pittsburgh, Pa.
Laclede Steel Co., Arcade Bldg., St. Louis, Mo.
Michigan Steel Tube Products Co., 9450 Buffalo St., Detroit, Mich.
Ohio Seamless Tube Co., Shelby, O.
Republic Steel Corp., Dept. ST, Cleveland, O.
Revere Copper & Brass Co., Inc., 230 Park Ave., New York City.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.
Youngstown Sheet & Tube Co., The, Youngstown, O.

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Ohio Seamless Tube Co., Shelby, O.
Steel & Tubes Division, Republic Steel Corp., Cleveland, O.

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Haynes Stellite Co., Harrison and Lindsay Sts., Kokomo, Ind.
Michigan Tool Co., 7171 E. McNichols Rd., Detroit, Mich.

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Firth-Sterling Steel Co., McKeesport, Pa.

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Vanadium Corp. of America, 420 Lexington Ave., New York City.

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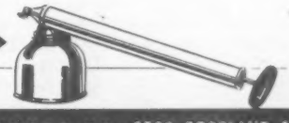

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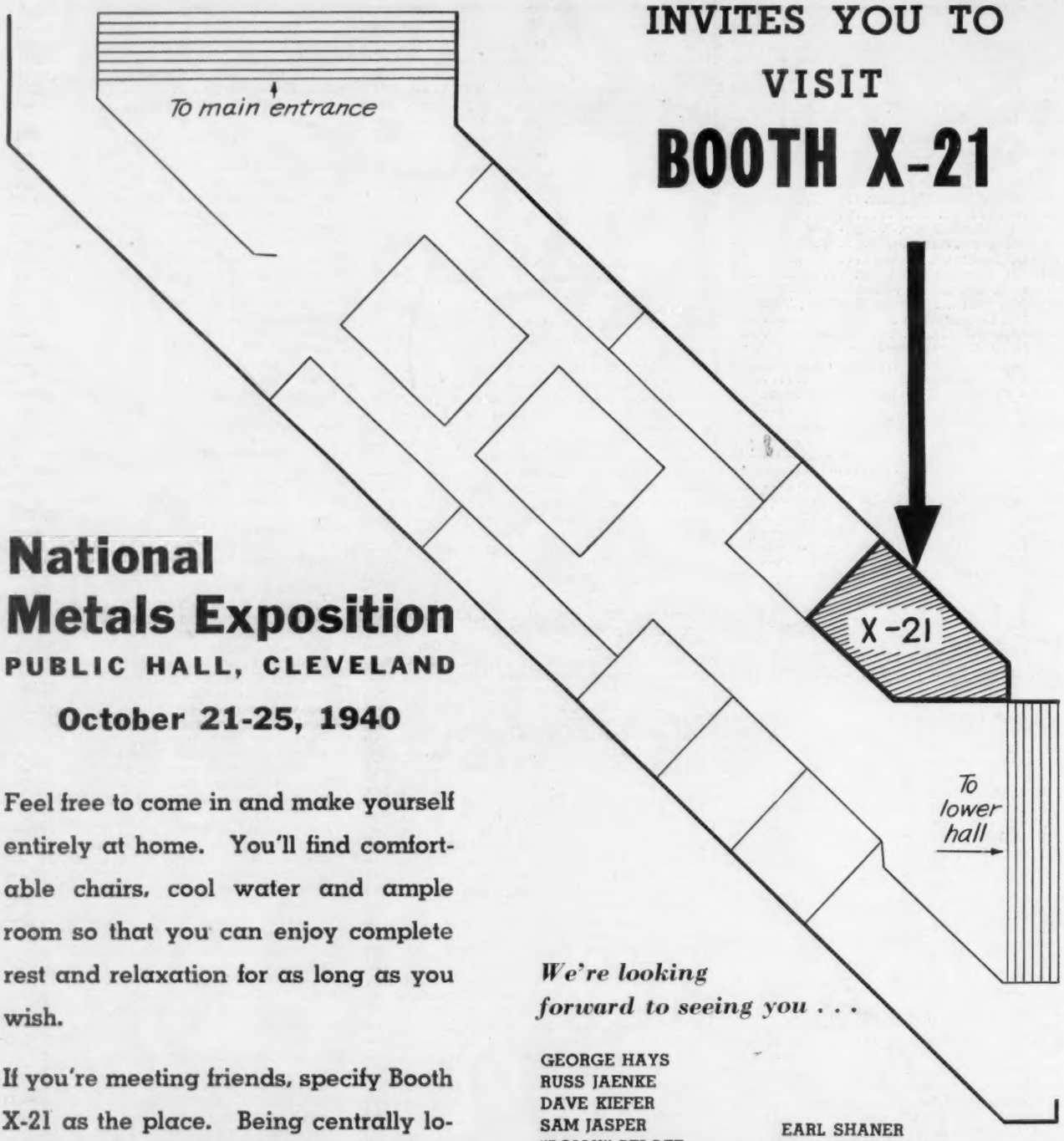

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Reader COMMENTS

Readers are invited to comment upon articles, editorials, reports, prices or other editorial material appearing in STEEL. The editors cannot publish unsigned communications, but at their discretion may permit a writer to use a pseudonym when a bona fide reason exists for with-holding his identity. Letters should be brief—preferably not exceeding 250 words

Not Authorized by STEEL

To the Editor:

We have been approached by a New York photographer who says he wishes to photograph our executives on behalf of STEEL. We wish to co-operate with you but first want to make sure that this party actually does represent you, since we have heard of instances of this kind where the photographer misrepresented himself. Please advise your position in this matter.

SALES MANAGER

New York

Editor's note: No photographer has authorization to represent STEEL. At one time STEEL did have such representatives but these arrangements were discontinued some years ago because of abuses, and also because such a service no longer is necessary. In recent years, as a result of a widespread appreciation for publicity, it has been customary for the men of industry to provide photographs of themselves on newsworthy occasions or upon request. When STEEL does find it necessary to make arrangements to make portraits it takes up the matter directly through its editorial staff.

Must Decentralize Industry

To the Editor:

Particularly since mid-September, every bomb dropped into an inland English or German city adds evidence to the case for decentralizing manufacturing in our national defense program, geographically and in planning location of buildings. Curtains of fire around the rim of a nation or district look good in theory, but don't work in practice. As an adage, "You can drop 'em farther than you can shoot 'em high."

Land defense used to be calculated on the single level of earth and water. If military coast defenses were "impregnable," and if industries were moved inland, the very apparent result was safety for sources of war materials and defense industry personnel. Early planes added another dimension, but changed conventional calculations only slightly. In the World War, planes were utilized almost exclusively on military objectives, usually in the combat area.

It is evident that there is less danger inland than on the coast. But to call it fantastic to speak of possible devastating attacks on inland cities of this country is merely to repeat what was said about Poland, the Netherlands, England and Germany a little over a year ago. Industrial cities in Europe have been macerated since. And for good reason. Bombing of plants manufacturing munitions, war implements, foods, cuts off vital sources of supply without which no warring nation can continue. The larger the unit, the more important it is to an enemy to put it out of commission. If censored newspaper reports are reasonably accurate, manufacturing centers of both Britain and Germany are among the most sought objectives of the rival air forces.

While it is true that air line distances between warring European nations are in many cases far less than between sections in this country, over half of our manufacturing activity is located in 33 industrial areas, largely within the northeastern United States. Enemy planes based on aircraft carriers or secret fields could very conceivably slip through our coastline defenses.

That being true, decentralization of units in a given locality is almost as important as geographic decentralization. It seems strange for Americans to even think of sacrificing large scale straight line production on the altar of greater national and individual safety. But what price huge modern layouts and operating efficiency if a bomb not only wrecks the tool room, but the grinding, finishing and assembly departments simultaneously? Efficiency may yet include movement of parts between smaller, separate units if today's signs in the sky mean anything. Mass assembly can still be maintained if parts flow to the assembly line from separately placed units.

To add that this movement might be underground in bomb proof tunnels or in locations lending themselves to camouflage from enemy eyes, lays the writer open to flank attack from idealists. Yet the Germans, according to several reports, have built manufacturing plants underground as well as in forests and other locations offering camouflage and protection. Such locations, automatically serving as air raid shelters, have not apparently impaired German efficiency. Experienced military men call English manufacturing plants built in the open like our own, "suicide plants."

Workers Are An Asset

Protection of the human element involved in defense industries must be considered not only from the humanitarian viewpoint. It inevitably takes time to train defense workers. Many of our defense industries have plants, equipment, orders and materials for processing. But production waits on trained operators. Fifty-five per cent of the country's wage earners are employed in the northeastern area. More are being trained. These workers and their specialized knowledges represent a national investment in American protection. That investment should be better pro-

(*Please turn to Page* 72)

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